B. Mechanical Engineering Industries

4. INDUSTRIAL MACHINERY

It was during the Second World War that some beginnings were made in the manufacture of industrial machinery in India due to difficulties faced at that time in procuring capital goods. Subsequently in the post-war period, the manufacturers formulated plans on a more substantial scale in association with reputed firms abroad for developing the production of several items on an organised basis *e.g.*, the Machinery Manufacturers Corporation for Carding Engines, the National Machinery Manufacturers for spinning ring frames etc., the National Bearings for ball bearings. The First Plan witnessed considerable progress in investments as well as diversification of production of items of machinery. It is estimated that the output of capital goods and industrial machinery was about Rs. 20-25 crores in 1955 as against about Rs. 3 to 4 crores at the commencement of the Plan. The progress under the First Plan and programmes of development under the Second Plan in regard to electric motors, electric transformers, diesel engines, power—driven pumps and tractors and other capital goods items like electric wires and cables, railway rolling stock and ships have been described separately and in full detail in this volume. This section deals particularly with the following:—

(1) Cotton textile machinery,
(2) Jute textile machinery,
(3) Cement machinery,
(4) Sugar machinery,
(5) Paper making machinery,
(6) Heavy electrical equipment,
(7) Machine tools,
(8) Heavy foundries and forges,
(9) Miscellaneous.

1. COTTON TEXTILE MACHINERY

I. Review of Progress in the First Plan

Targets.—The Plan envisaged as the major item of development the completion of the programme for the manufacture of ring frames and spare parts by the National Machinery Manufacturers which was under implementation in April 1951. It further envisaged the following targets of capacity and production for three of the major items of machinery required by spinning mills:

		1950-51		1955-56	
		Rated capacity	Actual production	Rated capacity	Actual production
(a) Spinning ring frames	(Numbers)	396	260	800	700
(b) Plain, semi-automatic and automatic looms .	„	3,600	1,894	8,000	6,000
(c) Carding engines	„	600	Nil	600	600

Capacity and production.—The progress of the industry, which was slow to begin with, has been highly satisfactory in the last two years. The National Machinery Manufacturers who started in 1951-52 with the manufacture of components of spinning ring frames like spinning rings, ring spinning spindles, fluted rollers, top rollers and plain cast iron inner tube bearings for ring spindles and equipped their works with a foundry for production of 400 tons of castings per month on single shift basis, developed the production of complete ring frames in 1954. The annual installed capacity in existence at the end of the First Plan (on double shift basis) was for 1,596 spinning ring frames; 792 carding engines and 4,980 looms—plain, semi-automatic and automatic. There are also production facilities though to a relatively less extent, for the manufacture of draw frames (18 units), fly frames (24 units) and reeling machines (408). The production of automatic looms was also developed during this period.

The output of carding engines, spinning ring frames and looms, plain and automatic, has shown a marked expansion—in the case of carding engines and spinning frames, the targets were exceeded. The figures of output since 1950 are as under:—

	Carding engines	Spinning ring frames	Looms	
	(Numbers)	(Numbers)	(Numbers)	
1951	Nil	276	2,280	
1952	108	288	1,968	(222*)
1953	192	284	1,812	(930*)
1954	436	357	1,970	(178*)
1955	649	863	2,787	(75*)

*Output of automatic looms.

In addition to these machines, there has also been some production of draw frames (16 in 1954), fly frames (13 in 1954) and reeling machines (150 in 1954). Spindles, spinning rings, fluted rollers, tin rollers, etc. were also produced for meeting replacement demands. The output of some of these items for direct sale has been as under since 1951:

	Spindles	Spinning rings	Fluted rollers	Tin rollers
	(Numbers)	(Numbers)	(Numbers)	(Numbers)
1951	100,796	185,650	41,213	560
1952	128,167	319,984	32,519	487
1953	317,341	336,540	27,828	354
1954	357,305	633,020	41,017	530
1955	455,000	555,000	550,000	880

As regards the production of finishing machinery, there are three principal producers who manufacture to specific orders. The items currently produced are: drying range, padding mangle, dye jigger, ager, finishing scutcher, stretching, stentering, soaper and washing machines. The total output of these and other minor producers is currently estimated at about Rs. 50 to 75 lakhs per annum.

Quality and range of products.—The indigenous manufacturers took several steps to improve the quality of their machinery and to increase productivity in the industry. Texmaco, Calcutta installed a fully mechanised foundry, other modern equipment such as plane grinders, rotary grinders, circular grinders, special purpose core grinders etc. They are in a position to supply ring frames with some of the high draft systems. The Textools have installed laboratory facilities for testing the quality of materials before use. The National Machinery Manufacturers entered into an agreement with Platt Bros., for securing the results of their researches into textile machinery manufacture. More universal check-up of products at various stages of manufacture has secured improvements in quality. The Tariff Commission while examining critically the complaints made against the quality of indigenous machinery in connection with their enquiry of 1953 stated that several of the complaints did not take into full account the recent improvements and related to purchases of machinery made in the past. Nevertheless, the scope for further improvement was recognised and the suggestions were made that:—

(a) Standard specifications should be formulated for textile machinery components, and

(b) adequate arrangements should be brought into existence for an impartial investigation of all complaints from the consuming industry about the quality of indigenous products and for keeping a continuous watch over the progress of the textile machinery industry as a whole.

These recommendations are under implementation at the commencement of the Second Plan.

Imports.—Imports of cotton textile machinery in terms of overall value have been as under since 1951-52:—

	(Rs. crores)
1951-52	7·3
1952-53	9·3
1953-54	7·4
1954-55	7·2
1955-56 (April-December)	5·6

Item-wise imports of machinery are not given in the Foreign Trade and Navigation Accounts of India. The break-up of imports of protectedc ategories for 1951 and 1952 is reproduced below from the 1954 Report of the Tariff Commission:—

	(Rs. lakhs)	
	1951	1952
Spinning frames	1,54·54	2,37·35
Spinning rings	5·71	9·78
Spindles	36·64	39·16
Fluted rollers	..	2·12
Tin rollers	..	0·04
Plain looms	92·80	1,14·12

Consumption.—On the basis of domestic production, plus imports, the total value of the textile machinery used for the expansion of the textile industry, replacements and modernisation and for maintenance during the period of the Plan, is estimated at about Rs. 58 crores. This is exclusive of the electrical machinery like motors and equipment for power generation and distribution installed in mills. The value of indigenous textile machinery utilised during this period is estimated at about Rs. 12·0 crores out of this total.

Capital and labour.—The fixed capital investment in the textile machinery industry is estimated at about Rs. 5·0 crores by the end of the First Plan as against Rs. 3·2 crores in March 1951. During this period, the Central Government participated in the preference share capital of the Machinery Manufacturers Corporation to the extent of Rs. 25 lakhs in order to assist the company to tide over temporary financial difficulties.

As against a labour force of about 4,000 engaged in the industry in 1951, the strength in 1953 is estimated at 4,670 and about 5,000 at the end of the First Plan.

Problems of the Industry: (a) *Raw materials.*—The manufacturers have experienced considerable difficulties in procuring raw materials, for instance, graded pig iron essential for the production of good castings, hard drawn bright flats and bars required for warp stop motions, steel sections required for fluted rollers and spindle steel. Manufacturers had to use offgrade pig iron which, apart from being expensive on account of the ferro-alloys which necessarily had to be used with it, does not give satisfactory results. While sections varying by 1/16" are required for the manufacture of fluted rollers, the black form of steel sections rolled by the Tata Iron and Steel Company (TISCO) vary by 1/8". Though spindle steel is produced by some of the re-rollers, indigenous supplies were irregular leading to non-fulfilment of schedules of production. The recommendation made by the Tariff Commission in their Report of 1954 on the Continuance of Protection to the Cotton Textile Machinery Industry that high priority should be given to the industry in the allocation of materials was accepted by the Government.

(b) *Installation of loomage in mills.*—The production of looms is considerably short of the target envisaged under the Plan, but this is due to the Government's policy of restricting the installation of fresh looms and the difficulties connected with the introduction of automatic looms in existing mills. The uncertainty of policy has hampered the development of the section of the industry concentrating on the production of weaving machinery. With reference to this matter, the Tariff Commission stated that the Government should give a clear indication of their policy to the textile industry as early as possible.

Tariff protection.—At the commencement of the Plan, ring frames, spinning rings and spindles were subject to a protective duty of 10 per cent *ad valorem*. Under the Finance Act of 1951 a revenue surcharge of 5 per cent was imposed. In order that the protective duty on complete ring frames might be fully effective, Government found it necessary to extend the application of the duty to all parts of ring frames. Thus fluted rollers and tin rollers became subject to a protective duty of 10 per cent *ad valorem*. In the light of recommendations regarding fluted rollers and tin rollers, subsequently made by the Tariff Commission, protection to those parts was made co-terminus with ring frames *i.e.*, up to March 31, 1953. Protection to all these items of machinery was extended up to December 31, 1954 on the advice of the Tariff Commission.

In 1953, the Tariff Commission undertook an enquiry into the question of the continuance of protection to the industry. In connection with the assessment of domestic costs of production *vis-a-vis* landed cost of imported machinery, the Commission came to the following conclusions:—

Price levels of protected categories

	Fair selling price	Landed cost without duty	
		British	Japanese
	(Rs.)	(Rs.)	(Rs.)
(1) Ring frames	26,139	29,209	24,047
(2) Spindles	7·66	7·063	4·763

	Fair selling price	Landed cost without duty	
		British	Japanese
(3) Spinning rings	1·705	1·467	1·057
(4) Fluted rollers	11·916	13·720	9·976
(5) Tin rollers (per running foot)	18·000	26·56	..
(6) Looms (52" reed space)			
(a) Plain underpick	1,737·6	..	1,491·0
(b) Overpick	1,576·5	1,508·9	1,491
(c) Automatic	2,579·5	..	2,514·9

In formulating its recommendations regarding the measure of protection needed, the Tariff Commission took into consideration the following factors also :—

Ring-frames and looms.—(a) The strong preference of certain sections of the textile industry for British ring frames in spite of the higher prices;

(b) likelihood of import restrictions being maintained during the next few years for balance of payments considerations;

(c) allowance for freight disadvantage in working out fair selling price.

Spindles and rings.—Both spindles and spinning rings being important components of spinning machinery, any marked increase in their prices will adversely affect the programmes of replacements and modernisation in the cotton textile industry. In the circumstance, it would not be desirable to afford protection on the basis of the landed cost of Japanese spindles and spinning rings. As long as import control is continued, a lower duty of 10 per cent may meet the requirements of the situation.

Fluted rollers.—The protective duty should apply to fluted rollers of all kinds and not only to those used in spinning ring frames. The existence of consumer preference for British products is a factor to be reckoned with.

Tin rollers.—The indigenous production of tin rollers is well established and the domestic prices are well below the import price. The manufacturers are not affected by foreign competition.

Considering that the textile machinery industry had not yet acquired a firm foothold in the Indian market, the Tariff Commission recommended to the Government that protection should be extended for 3 years ending December 31, 1957 at the current protective duty of 10 per cent for spinning ring frames, spinning ring spindles, spinning rings, fluted rollers of all kinds and looms of all kinds and parts thereof. Government accepted and gave effect to these recommendations as from January 1, 1955.

II. Programme of Development in the Second Plan

Estimated requirements.—It is difficult at this stage to make a precise estimate of requirements of textile machinery during the Second Plan period since no final view has been taken of the developments to be permitted in the mill sector of the cotton textile industry. On the basis of a phased programme for implementing the recommendations of the Cotton Textile Inquiry Committee, the Textile Commissioner in July 1955 estimated the requirements of textile machinery in 1960-61 at about Rs. 17·0 crores. The subject has been further reviewed in the light of the present position and the requirements have been estimated on the basis of 350,000 new spindles being installed annually and the further assumption that all machinery more than 40 years old would be replaced. On this basis, the annual demand under the Second Plan for some of the major items of spinning plants are estimated at:—

	For new units	For replacement	Total
Ring frames (Numbers)	850	750	1,600
Fly frames („)	350	300	650
Draw frames („)	110	100	210
Carding engines („)	1,400	600	2,000

The value of the above machinery of spinning plants required annually amounts in all to about Rs. 8·0 crores. It is difficult to estimate the annual demand for weaving machinery etc., winding, warping and sizing machines and looms, ordinary and automatic. If the current policy is continued and the installation of new loomage cannot be regarded as a normal feature of the development of the cotton textile industry, the demand for weaving machinery would be primarily related to programmes of modernisation of weaving mills envisaging the introduction of plain and/or automatic looms. In this connection, it is necessary to stress the importance, from the export angle of modernisation since the automatic looms, according to the Tariff Commission's Report, account for only 4·7 per cent of total looms in India, compared to 31·6 per cent in West European countries, 11·5 per cent in the U. K., 100 per cent in the U.S.A. and 66·7 per cent in Japan. It would seem that if an annual replacement by 3,000 automatic looms is envisaged in the mill industry, a position somewhat comparable to that of the U.K. in 1953 would be achieved by 1960-61. On such a basis, annual requirements of weaving machinery for replacement will come to about Rs. 1·0 crores. Inclusive of miscellaneous demands for replacements of plain looms at a rate of about 3,000 to 4,000 per annum, the overall requirements of plain and automatic looms is placed at about Rs. 1·5 crores per annum exclusive of demands for adding to the existing capacity of the industry. In other words, loomage corresponding in value to about Rs. 1·5 crores per annum may be said to represent the minimum demand. This is equal nearly to installed capacity of the existing producers on a single shift basis.

The annual demand for winding, warping and sizing machines during the period of the Second Plan is estimated in terms of value at about Rs. 1·0 crore.

Dyeing, bleaching and finishing machinery.—These consist of several items most of which are made to order at present within the country. Some items with unit value exceeding Rs. 25,000 are padding mangle, dye jigger, drying range, ager, stentering machine and colour printing machines. The annual requirements of machinery estimated on the basis that the additional production of bleached, dyed and printed cloth to total output will maintain the current ratio is placed at about Rs. 1·25—1·5 crores.

Blow room machinery.—This comprises the hopper mule breaker, vertical opener, hopper feeder, porcupine opener, Crighton opener and stutcher. The value of each unit is estimated at about Rs. 4·25 lakhs and the annual demand corresponding to installation of 350,000 new spindles per annum at 56 units. The total value of machinery per annum would come to about Rs. 2·5 crores. The replacement demand for blow room machinery on the basis of renovating an aggregate spinning capacity corresponding to 750 ring frames per annum is estimated at Rs. 2·0 crores.

The overall domestic requirements of textile machinery in 1960-61 will thus correspond to a value of about Rs. 16·5 crores.

Considerable technological improvements are envisaged over the next few years in textile machinery manufacture. It can be expected that the price would also be brought down appreciably as a result of (a) reduced overhead charges with more intensive utilisation of plant facilities and (b) reduction in price of steel with the expansion of its domestic production. In view of these possibilities, there should be scope for exports of certain items of equipment. The requirements for such exports are estimated at Rs. 50 lakhs worth of machinery in 1960-61 and thus the overall demands for textile machinery would be about Rs. 17·0 crores in terms of value.

It has to be pointed out that the above assessment has not taken into account (a) the annual demand for 4,000 automatic looms that would arise if it is decided that additional loomage corresponding to 500 million yards of cloth should be licensed for production of cloth for export and (b) the demand for powerlooms for the programme of phased conversion of handlooms into powerlooms. The various issues connected with these programmes are still under consideration.

Schemes under implementation.—The following proposals made by private enterprise were approved by Government for implementation:—

Company	Ring spinning frames (Numbers)	Carding engines (Numbers)	Looms (Numbers)	Other machines (Numbers)
1. National Machinery Manufacturers	..	600	..	..
2. Textool Co.	..	..	..	Flyframes 48 Drawframes 12
3. Ramakrishna Industries, Peelamedu	..	..	..	Drawframes 12
4. Lakshmiratan Engineering Works	300	..	..	Drawing frames 36 Flyframes 120
5. Texmaco	..	300	..	..

Targets of capacity and production.—Assuming implementation of schemes already approved by the Government which have been summarised in the previous paragraph, the installed capacity for some of the major items will be as under:—

	Annual capacity on double shift basis (Numbers)
Ring frames	1,896
Carding engines	1,692
Drawing frames	84
Flyframes	168
Looms, plain and automatic	4,980

In assessing the quantum of further expansion to be visualised under the Second Plan against the background of demand discussed earlier, it would be desirable to keep the following two objectives in view:—

(a) The demand for the entire range of machinery required in the spinning and weaving operations, inclusive of the preparatory processes and finishing machinery, should be met from domestic sources with the exception of highly complex machines and items required in small quantities;

(b) In view of the heavy investments required for establishing production facilities it would be advantageous to put the machines to intensive use by arranging for double shift operation.

In connection with (a) above, arrangements have to be ensured *inter alia*, for the manufacture of blow room machinery.

Having regard to quantum and pattern of requirements, the production of textile machinery in 1960-61 is provisionally visualised in terms of an output valued at Rs. 17·0 crores.

Capital investment.—It is provisionally envisaged that for expansions, creation of balancing facilities for operating plants on double shift basis etc., for achieving an output of Rs. 17·0 crores worth of textile machinery in 1960-61 on the lines mentioned above, an investment of Rs. 4·5 crores would have to be incurred during 1956-61.

2. JUTE MILL MACHINERY

In the jute mill industry, the investment programmes during the First Plan were primarily connected with replacement and modernisation. These programmes gathered considerable momentum by 1954-55 as the following statistics relating to import of jute mill machinery show:—

Imports of jute machinery	(Rs. lakhs)
1951-52	1,66·0
1952-53	1,77·8
1953-54	2,23·0
1954-55	3,32·0
1955-56 (April–December)	2,97·8

During the Second Plan more rapid progress is expected to be made in regard to the modernisation and replacement of jute mill machinery especially in view of the active support proposed to be given by the National Industrial Development Corporation (NIDC) to this premier export industry. The Second Plan includes financial provision under the NIDC for affording necessary monetary assistance to jute mills. According to the Indian Jute Mills Association, the annual replacement demand for spinning frames is estimated at 500 units for some years to come.

Schemes under implementation.—During 1955, the following three schemes for the manufacture of jute mill machinery were approved:

Name of Company	Technical collaboration with	Annual capacity for spinning frames (Numbers)
1. Britannia Engineering Works	James F. Low & Co. of Scotland.	240
2. Textile Machinery Corpn.	Fairbairn Lawson Combe Barbour of Leeds.	300
3. Legan Jute Machinery Company	Subsidiary of James Mackie & Sons, Belfast.	120

The Textile Machinery Corporation Ltd., is also expected to develop capacity for the production of 288 drawing frames and 180 carding engines per annum. By the end of the First Plan, the Britannia Engineering Works commenced production of spinning ring frames.

Programme of Development in the Second Plan.—Both Texmaco and the Legan Jute Machinery Co. are expected to be in production in 1957. On this basis, imports of jute mill machinery should show a substantial decline from 1957-58 onwards in respect of spinning frames, drawing frames and carding engines. In regard to these items, imports will be mainly of components the domestic production of which will be progressively stepped up. The additional investment required during the Second Plan for developing the production of jute spinning and preparatory machinery and stepping up their Indian content to near self-sufficiency is visualised at Rs. 1·3 crores. Production target for jute machinery is placed at Rs. 2·5 crores in terms of value by 1960-61.

3. CEMENT MACHINERY

The Second Plan envisages a target of 16·0 million tons capacity for the cement industry by 1960-61 as against 4·9 million tons in March 1956. The fixed investment for achieving this target is placed at Rs. 82·0 crores. Assuming the value of machinery (exclusive of electrical equipment) at 50 per cent of the total investment, it would amount to about Rs. 40·0 crores over the quinquennium. If the expansion of the industry is phased uniformly over the five year period, the annual requirements of machinery would be of the order of Rs. 8·0 crores.

Cement being one of the major developmental commodities it is reasonable to assume a high rate of expansion of this industry under successive plans. Such rates of expansion to be achieved without causing strain on foreign exchange resources require that arrangements should be made for the manufacture of machinery in the country. So far, the manufacture of cement machinery is confined to relatively smaller parts required for replacements though the Associated Cement Company (ACC) fabricate rotary kilns in their workshop for part of the needs of the ACC factories. The value of the output of such cement machinery produced in 1954 was estimated at about Rs. 50 lakhs.

During 1955, the ACC were permitted to develop facilities for the manufacture of clinker coolers and clinker breakers in technical collaboration with Fuller and Co. of the U. S. A. The production capacity under the scheme is envisaged at 6 of each per annum.

Programme of Development in the Second Plan.—The programme provisionally formulated envisages the creation of capacity for 4 cement plants of 500 tons daily capacity each, for meeting the annual requirements on account of replacements from 1960-61 onwards. The annual turnover of machinery is estimated at Rs. 2 crores.

Though a target of cement machinery worth Rs. 2 crores per annum by 1960-61 has now been proposed, it is needless to say that it would be of considerable advantage to step up the investment and output in this field. A proposal for such a substantial advance is under contemplation by the Associated Cement Companies in collaboration with the Vickers Armstrong of the U. K.

4. SUGAR MILL MACHINERY

The sugar mill plants include (a) machinery for the cane crushing section (b) high speed and/or continuous type centrifugals and (c) machinery for clarification, evaporation, condensation etc. At the commencement of the Second Plan, the following six firms were engaged in manufacturing machinery falling under section (c).

1. Bery Brothers, 24-Parghanas, West Bengal.
2. The Saran Engineering Co., Marhourah.

3. Richardson & Cruddas, Bombay.
4. Arthur Butler & Co., Muzafarpur.
5. Indian Sugar & General Engineering Corpn., Ambala.
6. Port Engineering Works, Calcutta.

During 1955-56 the following applied for permission and were allowed to instal facilities for the manufacture of the entire range of sugar mill machinery:

Company	Technical collaboration with	Capacity
(a) Walchandnagar Industries	Skoda Works of Czechoslovakia.	One mill in 1957-58 and two per annum on double shift basis thereafter.
(b) Protos Engineering Co., Bombay . .	Buckan Wolf of Germany.	Two sugar mills per annum on double shift.
(c) Texmaco, Belghurriah	Storks Worspoor of Holland.	Two mills per annum.
(d) Indian Sugar & General Engineering Corporation.	A. F. Gaig & Co. Ltd., of Scotland & Eachr Wyss Ltd., Zurich.	Two sugar mills per annum on double shift.

Certain firms have also undertaken to produce parts of sugar mill machinery.

On the basis exclusively of replacement requirements it is estimated that after 1960-61, there would be need annually for the equivalent of 5 sugar plants of 1,000 tons per day crushing capacity. The expansion of the sugar industry under the Second Plan involves an investment of Rs. 50 crores, covering expenditure on land, buildings, machinery, etc. over the five-year period. The demand for sugar machinery alone is expected at an annual rate of about Rs. 4·0 crores, exclusive of electrical equipment, steam raising plants etc. Assuming that the rate of the expansion of the sugar industry would at least maintain the same pace under the Third Plan, there should *prima facie* be much further scope for expansion of facilities for production of sugar mill machinery. The provisional target output of sugar mill machinery is estimated at Rs. 2·5 crores in terms of value in 1960-61. It is expected to involve an outlay of Rs. 2·0 crores.

5. PAPER MAKING MACHINERY

The manufacture of paper machinery has not made any significant beginning so far, though one or two firms are stated to be equipped to produce certain items. The target suggested for 1960-61 *viz.*, machinery worth Rs. 4·0 crores is based on a programme envisaging the manufacture of the entire range of machinery for a paper mill of 50 tons daily capacity. An investment of Rs. 1.3 crores is anticipated to be needed in this connection in addition to utilising spare capacities of heavy engineering workshops, forges and foundries.

6. OTHER MAJOR PROGRAMMES IN THE PRIVATE SECTOR

It would be difficult to enumerate all items of machinery, the manufacture of which has been or is likely to be undertaken. As a general proposition, it can be said that schemes for the manufacture of machinery in terms of the revised Industrial Policy Resolution of April 30, 1956 should be given high priority since they will strengthen a vital sector of the national economy.

In this connection, it is pointed out that the scheme for the manufacture of high pressure boilers by the Texmaco, Belghurriah and of high speed diesel engines of 50 H.P. and above recently approved, will fill an important gap in the capital goods sector.

Heavy machinery manufacture in the public sector.—The Second Plan has placed heavy engineering and machine building industries among items which have been assigned the first priority. The revised Industrial Policy Resolution, while stressing the importance of machinery manufacture, made the following classification of machinery for future development:

Schedule A.—Machinery Industries in which future development will be the exclusive responsibility of the State:

(i) Heavy castings and forgings of iron and steel;

(ii) Heavy plant and machinery required for iron and steel production, for mining, for machine tool manufacture and for such other basic industries as may be specified by the Government;

(iii) Heavy electrical plant including large hydraulic and steam turbines;

(iv) Ship-building;

(v) Telephones and telephone cables, telegraph and wireless apparatus (excluding radio receiving sets).

Schedule B.—Machinery Industries in whose development the State will take an increasing role, but in which private enterprise will also be allowed to participate.

(i) Machine tools.

The rest of the field of industrial machinery is left for development by private enterprise. It is nevertheless open to Government to undertake production even in the sphere assigned to the private sector.

Consistent with the high priority set for industrial machinery, it is necessary for the Government to accelerate the pace of development in projects initiated during the First Plan as well as to start or help starting new lines of production. With this object in view, the following developments have been provided for under the Second Plan in the public sector.

(a) *Expansion of Machine Tools manufacture.*—Progress on the machine tool project was considerably behind schedule under the First Plan. The targets visualised in 1951 were scaled down in a subsequent review of the scheme and the capacity of the factory was reduced from 1,600 lathes to 400 lathes per annum. The actual progress falls considerably short of even the reduced target, the number of machine tools manufactured in 1955-56 being only 12. Machine tools manufacture lays the basis for industrial expansion and, therefore, their production has to be stepped up as well as diversified. Under the Second Plan, the Hindustan Machine Tools envisages expansion of production of 8½" centre lathes to 400. A plan for further expansion of the factory at a cost of Rs. 2 crores so as to develop the production of other tools was put forward by the Ministry of Production and included in the Plan. Government appointed in February 1956 a Committee to assess the overall requirements and the pattern of future development of the machine tool industry. As a part of the overall programme, the expansion of the Hindustan Machine Tools is under consideration of the Committee.

The production of lathes at the Jalahalli Works of Hindustan Machine Tools is expected to be worth Rs. 1·5 crores in 1960-61. The production in the private sector is currently worth about Rs. 75 lakhs per annum. Imports of machine tools in 1954-55 were valued at Rs. 2·70 crores. A provisional target of Rs 3·0 crores worth of machine tools is proposed for 1960-61 for the public and private sectors pending submission of the Report of the Expert Committee.

(b) *Heavy Electrical Equipment project.*—Under the First Plan, measures for the establishment of a heavy electric equipment project were envisaged in the later years. Though the preliminary work connected with the estimation of demand, demarcation of spheres between public and an already existing private sector, and the selection of technical consultants for the execution of the project took a considerable time, these have been completed by the end of the First Plan.

In 1955-56, the Associated Electrical Industries Ltd. (A. E. I.) were selected as the Consultants for the project and an agreement was signed with them. The technical team of AEI undertook a survey of the different locations in the country considered appropriate for the project and after considering the advice tendered by the team, the Government selected Bhopal as the site.

The overall investment on this project, which is expected to take about 7 to 8 years to complete, is provisionally estimated to be Rs. 25 crores. The Second Plan makes a provision of Rs. 20·0 crores and it is envisaged that certain sections of the plant will go into production by 1960. While heavy transformers, industrial motors, traction motors and switchgear are likely to be produced before the end of the Second Plan, more basic items of equipment like hydraulic turbines and generators and generators for diesel sets will not be produced till the early years of the Third Plan. On the completion of the project, the capacity for the production of different items of electrical equipment with an aggregate annual turnover of about Rs. 8 crores is expected to be as under:—

1. Hydraulic turbines and generators	175,000 KW per annum.
2. Generators for diesel sets	34,000 KW per annum.
3. Transformers 33 KV and above	500,000 KVA per annum.
4. Current and potential transformers	Suitable numbers.
5. Static capacitors	54,000 KVA per annum.
6. A. C. circuit breakers	11 KV and above.
7. D. C. circuit breakers	Suitable numbers.
8. Switch Boards and Control desks	Do.
9. Direct current machines, generators and excitors, welding generators and motors	7,000 KW per annum. Required number of units 2,000 H.P. per annum.
10. Traction motors, apparatus and equipment	75,000 H.P. per annum.
11. A. C. Industrial motors, ratings of 200 H.P. and above	50,000 H.P. per annum.
12. Industrial motor control	Within the range of motor ratings for State Factory.

The Heavy Electrical Plant project will draw heavily on the available technical personnel. In the report of the Technical Consultants, the personnel requirements estimated in different categories are: administrative 735; supervisory or trade personnel 5,715; skilled technical 4,550; and semi-skilled and unskilled 6,200. The Consultants agreement with AEI provides for the preparation of a scheme for the training of Indian personnel after taking into account facilities available in existing workshops and advice on the establishment of a training centre.

Heavy Foundries and Forge Shops.—The manufacture of heavy industrial machinery and capital goods like locomotives, diesel engines, tanks, heavy electrical plant, sugar mill machinery, tractors and earth moving equipment and metallurgical plants will require heavy castings of iron and steel and of ferro-alloys as well as heavy forgings, which are not so far produced in the country. The establishment of facilities for turning out these essential components has to be regarded as an integral part of plans for the production of heavy and complex machinery and of capital goods in the country. Arrangements have been made for the establishment of a foundry for heavy castings by the Tata Locomotive and Engineering Company in the private sector and the project now under implementation should be completed by 1957-58. Similarly, the Chittaranjan Locomotive Factory provides under the Second Plan for the establishment of a heavy foundry for meeting the requirements of heavy castings for railways entirely from within the country.

In order to accelerate progress in the field of machinery manufacture in the public and private sectors the NIDC have taken up the establishment of heavy steel foundry and forge shop facilities in the public sector. A provision of Rs. 12 crores is tentatively envisaged for this project out of the total allocation made for the NIDC during the Second Plan. The preparatory work relating to the formulation of a project report has been taken in hand. The foundry and forge shops of the NIDC will have an initial capacity of about 15,000 tons for steel castings, 12,000 tons for forgings and 10,000 tons for grey iron castings per annum according to the provisional estimates.

Apart from the establishment of foundry and forge shops, the NIDC will direct its efforts towards fostering the manufacture of heavy machinery like earth moving equipment, rolls and rolling mill equipment required in ferrous and non-ferrous industries. Having regard to the priority assigned to heavy machinery industries under the Second Plan, it is necessary to explore from time to time the possibilities of increasing the output as well as diversifying the range of production.

The manufacture of machinery and capital goods require a high level of expert knowledge in designing work. Early arrangements will have to be made for the creation and continuous expansion of knowledge in this field by methods such as the establishment of designing and consultant organisations in the country and arrangements for training facilities for Indian personnel in the establishments of the foreign collaborators associated with the machinery projects taken up for development. Since the manufacture of machinery involves high precision work and the personnel at different levels require considerable training in order to gain operational efficiency, the plans for technical training have to be closely co-ordinated with the programmes for the development of machinery manufacture in the coming years.

5. STRUCTURAL FABRICATION

The fabrication of structurals holds an important position in the engineering industry, providing an essential link between the main producers of steel and its consumers. Structures of different types are required by the Railways, port authorities, Public Works Department and engineering industries and in the manufacture of a variety of equipment and machinery. In fact structrual fabrication forms an integral part of many engineering establishments. Its importance in a rapidly developing economy which lays stress on the manufacture of heavy machinery and equipment can hardly be over-emphasised. The absolute necessity of developing capacity for the fabrication of structurals is evident from the fact that progress in other industries and other sectors of economy will depend to a great extent on the speed at which structural fabrication work can be completed.

Structural fabrication is an important specialised industry requiring large workshops and extensive mechanical equipment; it also requires trained and experienced engineers and skilled workers. Unlike many other industries, the fabrication industry does not turn out uniform products; and the type of work in this field is mostly of the jobbing variety. In other words, the same machinery is used for producing a large number of widely different structurals. In this country the industry had its origin in the engineering establishments set up at the beginning of the century mainly to meet the requirements of the Railways, Public Works Departments, etc. The industry expanded considerably during the Second World War under the stimulus of demand from the Defence Department. During the post-war period in spite of the large volume of demand arising from constructional programmes, the industry was not able to operate to full capacity owing to the shortage of steel. Recently, however, the position has materially improved.

I. Brief Survey of the Industry

The more common varieties of structures that are fabricated can be roughly classified under the following heads:—

(i) Structural fabrication required for workshops, buildings, ware-houses, power houses, hangers, etc.

(ii) Structures for road, railway or river bridges, jetties, docks.

(iii) Structural fabrication required for steel plants, coke-oven plants, cement, paper mills, chemical plants, etc.

(iv) Steel fabrication for mechanical handling equipment like cranes, winches, derricks.

(v) Hydraulic steel structures like sluice gates, operating gears, penstocks required in hydro-electric and irrigation schemes.

(vi) Aerial handling equipment like rope-ways, cable-ways including cages, trolleys, trestles, etc.

(vii) Power transmission towers.

(viii) Pressed steel or welded steel tanks for water and oil storage.

(ix) Miscellaneous structural work of pressed, welded or rivetted type.

In addition to the above, the manufacture of railway wagons, underframes, coaches, signalling equipment and the construction of ships also involve considerable fabrication work. The development programmes for the shipbuilding and railway rolling stock industries have been dealt with elsewhere in this volume.

Capacity and production.—At present, 69 factories among those included in the Central list of Steel Processing Industries are engaged in the fabrication of structural items. This number does not take into account fabricators manufacturing railway wagons. The total capacity of these 69 factories has been assessed by the Development Wing at about 126,000 tons. Their regional distribution is as follows:—

State	Number of factories	Capacity on single shift (Tons)
West Bengal	25	78,144
Bombay	24	30,120
Madras	10	4,980
Bihar	3	7,680
Uttar Pradesh	1	48
Madhya Pradesh	1	108
Delhi	1	400
Other States	4	4,976
TOTAL	69	126,456

According to range of capacity these existing factories can be grouped as below:—

Annual capacity (Tons)	Number of units
13,000 to 15,000	2
6,000 to 9,000	4
4,000 to 6,000	4
1,000 to 4,000	21
100 to 1,000	38

It will be seen that more than half of the existing units are small ones with a capacity of less than 1,000 tons per annum. Although there are still fabricating firms in Bombay and Madras, in Bihar in proximity to the steel works, and in Kanpur, an important industrial town in the interior, the industry is predominantly localised in and around Calcutta at the present time. The other units mainly undertake light structural work.

As pointed out earlier, the manufacture of wagons also involves a large amount of fabrication work and in making an assessment of the overall capacity of the fabrication industry, account has to be taken of the capacity existing with the wagon builders, which is estimated at about 100,000 tons per annum. Thus the total fabricating capacity in the country may be reckoned at about 226,000 tons.

Detailed information on the types of structures, heavy, medium and light, that can be manufactured by these units is not available. According to the Engineering Capacity Survey Committee, 25 per cent of the total capacity can be utilised for the manufacture of heavy structures, 40 per cent for medium structures and 35 per cent for light structures. Seventy per cent of the capacity of the heavy structures is concentrated in the Eastern part of the country, the balance being in the Western region. Even in the case of medium and light structures, the bulk of the capacity is distributed between the Eastern and the Western regions. Due to lack of adequate quantities of steel, a substantial portion of the fabrication capacity was lying idle and the Engineering Capacity Survey Committee estimated such idle capacity in 1953 at 40 per cent in the Eastern area, 44 per cent in the Western area and 50 per cent in the Southern area. The position has, however, materially changed since 1953. With firm orders placed by the Railways and other departments of the Government like the Iron and Steel Ministry, the leading structural firms are already booked to their full capacity. Figures regarding actual output of structures in recent years are not available but it is estimated that in 1955 the output was about 90,000 tons.

Structural fabrication in the public sector.—Structural fabrication is also undertaken by some of the workshops in the public sector. For example, the Amritsar workshop of the Punjab Government has been executing work on some of the structures required for the Bhakra project. The future plans and patterns of production by this workshop are engaging the attention of the Government. Similarly, a workshop at Tungabhadra is engaged in the construction of sluice gates for the Tungabhadra project. The workshop at Maithon was also employed on the fabrication of structurals for the Damodar Valley Corporation project.

Imports.—Fabricated structures are imported either as integral parts of equipment or in the form of complete structures like power transmission towers, cranes, etc. According to the current policy, imports of structures are not allowed to established importers, but actual users' application are considered *ad hoc* for the import of structures required for specific purposes. In many cases it is not possible to indicate separately the types and quantities of structures that are imported within the country since, as stated earlier, they very often form part of equipment and machinery. Excepting railway wagons, imports of other fabricated structures are, therefore, not classified separately in the Foreign Trade and Navigation Accounts of India. It is, however, known that these imports have been taking place in substantial quantities in connection with the construction and development programmes of irrigation and hydro-electric schemes and establishment of industrial units in the public and private sectors. Even in cases where it is possible for the indigenous industry to undertake fabrication work, imports sometimes had to be resorted to because the structures were required urgently and supplies of steel within the country could not be made available in time. To achieve the objective of meeting the demand for fabricated structures from within the country to the maximum extent and keeping the indigenous industry fully occupied there is need for forward planning and proper phasing of orders. The following other factors are also said to have been responsible for the import of fabricated structures:—

(a) Absence of facilities in the country for producing some of the heavy castings and forgings and other components which are important integral parts of structures.

(b) The inflexibility of designs and equipment and the non-extension of franchise in regard to patents by some licencees to Indian industry.

Raw materials.—Heavy and light structurals of different sections, plates, bars of steel of mild and high tensile qualities, bolts and nuts, rivets, iron and steel castings, galvanised sheets and electrodes constitute the principal raw materials of the industry. All of them are produced in the country though in some cases indigenous production has to be supplemented by imports. Specially wide plates and sections beyond the capacity of Indian rolling mills are also imported. The general shortage and high prices of imported steel have been two of the major difficulties the industry had to face in recent years. With the expansion of the steel industry during the Second Plan period one of the main obstacles in the way of the development of the fabricating industry will be removed. Similarly the establishment of heavy foundries and forges is expected to supply the fabricating industry with its requirements of heavy castings and forgings.

Capital and labour.—Exact figures of capital investment in the industry are not available. A rough estimate, however, places it at about Rs. 11 to 12 crores. Figures of employment are not available.

II. Programme of Development in the Second Plan

Estimated requirements.—The Second Plan, with its accent on development of industry and transport, will make very substantial demands on the steel fabricating industry which will be called upon to provide different types of structures required in the establishment of new industrial units and workshops, in the construction of rolling stock, bridges etc., in the expansion of port facilities, and in a variety of other activities. During the Second Plan demand for fabricated structures will arise mainly from the following:—

(1) The expansion of the steel industry comprising the establishment of three new steel plants each of 1 million tons ingot capacity and the expansion of the three existing main producers will require a considerable amount of fabrication work to be carried out in a comparatively short period. It is estimated that fabrication of about 250,000 tons of structurals will have to be undertaken during the period 1957-60 in connection with the setting up of the three new steel plants. Similar requirements of the steel plants in the private sector are estimated at about 100,000 tons.

(2) Construction of three fertilizer factories at Nangal, Rourkela and Neyveli respectively with a total capacity of 230,000 tons of fixed nitrogen.

(3) Establishment of other major industrial projects like the heavy electrical plant, heavy foundries and forges, and the metre gauge coach factory.

(4) Establishment of the Caltex Refinery.

(5) Establishment of cement and heavy chemical factories and sugar and paper mills.

(6) Establishment of a 10,000 ton aluminium smelter at Hirakud and a second plant of similar capacity.

(7) Establishment of thermal power plants with a total capacity of 1·1 million KW.

(8) Opening of new coal mines at Korba and in other areas and the development of South Arcot Lignite deposits and the establishment of coke-oven plants.

In addition to the major industrial schemes mentioned above, the general emphasis on the development of heavy industry including industrial machinery will give a general fillip to the fabricating industry. Considerable demand for fabrication of heavy structures will also arise from road and railway programmes included in the Second Plan. Apart from major schemes like the bridge at Mokameh Ghat, construction of a large number of medium and small bridges will also be undertaken during this period. In the field of power distribution, transmission towers are likely to make large demands on the fabricating industry. Taking all these various developments into consideration it is estimated that the average demand for steel fabrication inclusive of the demand for wagon manufacture during the Second Plan period will be of the order of 450,000 tons per annum which is likely to reach a figure of 500,000 tons by 1960-61.

Schemes licensed and under implementation.—With the realisation of the growing importance of the steel fabricating industry certain schemes have been formulated in the private sector to expand the capacity of some of the existing units as well as to put up new workshops. The following new schemes and expansions have been licensed:—

	New schemes	Annual capacity on single shift (Tons)
1	K. T. Steel Industries, Gandhidham	3,000
2	Kalinga Engineering Corporation, Ranikhet	2,400
3	Priestley Dougal (India), Faridabad	810
4	Hindustan Electric Co. Ulhasnagar, Bombay	6,000
5	Alcock Ashdown, Bhavnagar	3,600
6	Shalimar Works, Howrah	1,200
7	Metal Craft (I) Calcutta	1,200
8	Government Central Workshops, Amritsar	4,800
9	Steel Works, Tinsukhia, Assam	300
10	General Superintendent, P. W. Workshops Stores, Madras.	1,200
11	Thermal Electrical Engineer, Azamabad Thermal Power Scheme, Government of Hyderabad.	1,200
12	Texmaco, Calcutta	3,600
	TOTAL	29,310

	Expansions	Expansion allowed on single shift basis (Tons)
1.	Britannia Building and Iron Co., Salkia (Howrah)	7,800
2.	New Standard Engineering Co., Bombay	2,120
3.	Hindustan Development Corporation, Calcutta	1,400
4.	Hindustan General Industries, Delhi	1,280
5.	Structural Engineering Works, Sewri, Bombay	640
6.	B. R. Herman & Mohatta (I), Bombay	1,940
	TOTAL	15,180

These schemes when completed will increase the capacity of the industry by about 44,000 tons per annum. In addition some of the other fabricators are also understood to have under consideration proposals for further expansion of the industry.

Additional capacity required.—Viewed against the requirements during the Second Plan and thereafter, the programmes in the private sector fall short of the level of development considered necessary and essential in the immediate future. Compared to the First Plan, the demand for fabricated structures will be very large in the next five years and unless immediate steps are taken to augment the capacity of the structural industry the progress of a number of developmental schemes might be seriously impaired. In the alternative large quantities of fabricated materials would have to be imported possibly at a higher price causing a serious drain on the limited foreign exchange resources. The expansion of the fabricating industry has also become a matter of importance from a different point of view. With the expansion of the steel industry, capacity will be created by 1960-61 for the production of 4·7 million tons of finished steel. The pattern of production of these steel plants is programmed in such a way that when they go into full production, they will turn out nearly 1 million tons of heavy, medium and light structurals. Unless the steel fabricating industry is expanded very considerably, the absorption of such large quantities of structurals is likely to create a serious problem. Thus, both from considerations of demand as well as the absorption of additional production of steel, the expansion of the structural industry has to be given a high priority. While the private sector should be suitably assisted and encouraged to set up additional fabricating units at appropriate locations in different parts of the country, these efforts will have to be supplemented by the establishment of one or more structural shops in the public sector either directly by the State or through the National Industrial Development Corporation. These shops will broadly have to cater to the demand for the heavier types of structures, capacity for which is at present grossly inadequate. The establishment of such shops is contemplated by the National Industrial Development Corporation. To begin with, it is proposed to set up a structural *cum*-machine shop at Bhilai and a structural shop at Durgapur. Preliminary work in connection with the establishment of these units has already been undertaken. These shops, if set up early, will be in a position to supply the needs of the new steel plants in the later stages of their construction. In due course consideration will have to be given to setting up more structural shops if necessary in the public sector. A tentative provision of Rs. 15 crores has been made in the Plan under the NIDC for foundries, forge shops and structural shops.

Targets of capacity and production.—The demand for the fabrication of structurals including wagon manufacture is estimated to be 500,000 tons by 1960-61. Having regard to the importance of this industry for providing the basic facilities for undertaking the manufacture of heavy machinery and equipment and as an essential means for the absorption of the large quantities of steel expected to be produced in the country it is considered necessary to achieve a capacity of 500,000 tons by 1960-61. It is further envisaged that the industry will operate to full capacity and turn out 500,000 tons of fabricated structures in the last year of the Plan.

Investment.—To achieve the above capacity it is estimated that an investment of Rs. 20 crores will have to be made during the Plan period. As stated earlier, part of the resources is expected to be found from the provision made in the Plan for the National Industrial Development Corporation.

Miscellaneous.—Shortage of steel had in the past generally acted as a serious deterrent to the expansion of the industry since it made it impossible to utilise even the existing capacity fully. The position is expected to alter materially in the course of the next three or four years when larger supplies of steel become available from indigenous sources. During the intervening period, however, difficulties are likely to be experienced in obtaining adequate quantities of steel unless special efforts are made to allocate steel to the fabricating industry on a priority basis. Such a course would be justified as it will not only assist the industry to keep itself fully occupied but will also help to create the necessary enthusiasm in the private sector to undertake the desired expansion of the industry. It will further provide the necessary experience in the fabrication of complicated structures and develop the demand for steel over a period of time. Within the limits of the fabricating capacity available at any time and provided deliveries are reasonable, imports of raw steel should, be preferred to imports of finished structures which should be permitted only in cases where the industry is not in a position to meet these requirements. Frequent consultations between the indenting departments and the fabricating industry and proper co-ordination in the distribution and phasing of orders should enable the existing facilities in the country to be fully utilised.

In connection with the expansion of the steel industry, fabrication work to the extent of about 350,000 tons has to be undertaken during the next three years. The existing workshops, which are busy with orders from the Railways and other indentors, do not have the capacity to undertake this work to any great extent during this period. This will call for the creation of additional capacity in the immediate future if large-scale imports of fabricated structures are to be avoided. In this connection a high priority has to be accorded to implementation of schemes for the expansion of the industry in the private and public sectors. It may also be desirable to design the equipment for the steel plants as far as possible, on the basis of easily available structurals to avoid delays in fabrication work arising on account of the non-availability of special sections which are not regularly rolled.

As already stated, structural fabrication is a specialised industry requiring a large number of experienced designers and engineers and skilled workmen. It is reported that difficulties are experienced even at present in obtaining suitable technical personnel to man the fabrication workshops. The very large expansion of the industry envisaged during the Plan period will become possible only if the required number of technical personnel at various levels is simultaneously made available. This is a matter of considerable importance since both engineers and workmen required by the industry have to be persons who have undergone training over a period of time. This emphasises the need for undertaking immediate large-scale training programme if the expansion of the industry is not to be impeded by a lack of adequate technical personnel. Some of the existing fabricators have made their own arrangements for training personnel to meet their requirements, but such efforts will have to be largely supplemented by training programmes sponsored by the State.

The manufacture of cranes, barges and light vessels, railway wagons and underframes etc., are closely linked with the fabrication of steel structurals. Many of the existing units have workshops which carry out the production of one or more items along with structural fabrication. The manufacture of these equipment call for facilities for castings and forgings. In fact the manufacture of many of the complex machinery and equipment will require simultaneously facilities for castings, forgings and steel fabrication. The National Industrial Development Corporation have under consideration schemes for the establishment of all these. In this connection it may be advantageous to locate production facilities in close proximity to the steel fabricating units.

The Structural Capacity Panel of the Engineering Capacity Survey Committee have made certain suggestions intended to make possible the fabrication in the country of steel structure which are at present imported. These suggestions deserve to be given serious consideration in the context of the developments envisaged during the Second Plan.

The following table summarises the development programme of the steel fabricating industry envisaged in the Second Plan:—

	1955-56	1960-61
Annual capacity *(Tons)	226,000	500,000
Production* (Tons)	180,000	500,000

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*Figures include the capacity and output of wagon-builders also.

6. RAILWAY ROLLING STOCK

I. Review of Progress in the First Plan

Targets, capacity and production:—(*i*) *Locomotives.*—At the beginning of the First Plan two locomotive factories were nearing completion, one at Chittaranjan where work started in 1948 and the other at Tatanagar where the old Peninsular Locomotive Works were handed over to the Tata Locomotive and Engineering Company (TELCO) in 1945. The Chittaranjan Locomotive Works (CLW) actually turned out 7 locomotives before the First Plan started and was expected to get into full production by 1957 and turn out 120 B. G. locomotives and 50 spare boilers per annum in that year. The Tatanagar factory which was designed to have a capacity of 50 locomotives and 50 spare boilers, was expected to go into full production in 1954-55. The Plan visualised that when these factories were completed and went into full production, the indigenous capacity for the manufacture of the locomotives would be 170 per annum. The target of production was placed at 438 locomotives for the entire Plan period.

The output of locomotives by these factories has gradually risen during the Plan period. The actual production during the last five years and corresponding targets in the Plan are indicated below:—

	CLW		TELCO	
	Target	Production	Target	Production
	(Numbers)	(Numbers)	(Numbers)	(Numbers)
1951-52	20	17	7	10
1952-53	32	33	30	30
1953-54	52	64	33	22
1954-55	72	98	50	47
1955-56	92	129	50	50
TOTAL	268	341	170	159

Thus the total production during the Plan period came to 500 locomotives as against the target of 438 visualised in the Plan.

The output of the Chittaranjan Locomotive Works has already exceeded the capacity figure of 120 locomotives envisaged for 1957. At TELCO there has been a shortfall of 11 locomotives but the target of 50 per year has been achieved during 1955-56. The fair price for the locomotives produced by TELCO is at present under consideration of the Tariff Commission.

Substantial progress was also made at both factories in reducing dependence on imported components. The indigenous content of the locomotives manufactured by TELCO is over 75 per cent. In the case of the Chittaranjan Locomotive Works it is even higher.

(*ii*) *Wagons.*—The Plan laid down an indigenous production target of 30,000 wagons for the entire five year period, 1951–56. The present capacity of the fabricating shops in the private sector for the manufacture of wagons is estimated at about 15,000 per annum. The actual number of wagons turned out by these manufacturers which stood at the low level of about 3,000 wagons in 1950-51 has improved very considerably in recent years as is evident from the following table:—

Year	Indigenous production of wagons
	(Numbers)
1951-52	3,707
1952-53	6,388
1953-54	6,882
1954-55	10,689
1955-56	14,300
TOTAL	41,966

The total production during the Plan period has exceeded the target of 30,000 wagons but has fallen short of the actual requirements of Railways which have proved to be considerably larger than the combined output of the indigenous manufacturers. Although capacity for additional production existed, one of the serious obstacles in the way of increasing the level of production was the shortage of steel. Special efforts have, however, been made to provide larger supplies of steel to the wagon builders, and consequently it has been possible in the last two years of the Plan to achieve a better utilisation of indigenous wagon manufacturing capacity.

(*iii*) *Coaches.*—The manufacture of passenger coaches falls largely within the public sector. The Railway Workshops, which get part of their work done through private contractors, are estimated to have a capacity of about 600 coaches per annum. The Hindustan Aircraft, Bangalore, increased their capacity for coach building from 100 to 180 coaches per annum during the Plan period. The workshops in the private sector are estimated to have an annual capacity of 250 coaches per annum. Since the demand for coaches was considered to be substantially higher than the total capacity of all these units, the Plan made provision for the establishment of an integral steel coach factory in the public sector. The latest estimate places the investment required on this project at Rs. 7·35 crores as against Rs. 4·0 crores originally envisaged. During the Plan period, an expenditure of Rs. 5·2 crores was incurred on the project. The factory which is located at Perambur in Madras, went into production in October 1955, and has turned out 12 B. G. unfurnished coaches by March 1956. Production is expected to be stepped up to the full capacity of 350 unfurnished coaches by 1959.

Indigenous production of coaches increased from 673 in 1951-52 to about 1,300 in the last year of the Plan. This, however, includes 280 imported coach body shells furnished in Railway Workshops. The actual production during the different years of the Plan has been as follows:—

Year	Indigenous production of coaches
	(Numbers)
1951-52	673
1952-53	791
1953-54	657
1954-55	970
1955-56	1,293
TOTAL	4,384

The total production has slightly exceeded the target of 4,380 coaches envisaged for the entire Plan period.

Imports and total availability.—It was envisaged that the Railways would make substantial progress during the First Plan period in clearing the arrears of replacement of rolling stock. The total stock which will have reached the normal age for replacement by March 31, 1956, was estimated to be 2,092 locomotives, 8,535 coaches and 47,533 wagons. In view, however, of the limited capacity of the indigenous fabricators and the shortage of steel, it was not considered possible to obtain the entire requirements of rolling stock from indigenous sources. The following pattern of procurement was therefore visualised in the Plan:—

	1951-56		
	Indigenous	Imported	Total
	(Numbers)	(Numbers)	(Numbers)
Locomotives	438	600	1,038
Wagons (in units)	30,000	19,143	49,143
Coaches	4,380	1,294	5,674

As against this programme, the actual number of rolling stock procured from abroad and indigenously has been as follows:—

	1951-56		
	Indigenous	Import	Total
	(Numbers)	(Numbers)	(Numbers)
Locomotives	500	1,062	1,562
Wagons	41,966	19,274	61,240
Coaches	4,384	497	4,881

Imports of rolling stock in each year of the Plan are given below:—

	Locomotives	Wagons	Coaches
	(Numbers)	(Numbers)	(Numbers)
1951-52	93	2,459	98
1952-53	150	5,248	191
1953-54	91	1,504	125
1954-55	247	4,525	12
1955-56	481	5,538	71
TOTAL	1,062	19,274	497

Part of the imports were obtained under the Colombo Plan and the Indo-American Technical Co-operation Agreement.

Investment.—The First Plan visualised an investment of Rs. 2·50 crores during the Plan period for the development of the railway rolling stock industry in the private sector. This was in addition to an estimated outlay of about Rs. 4·73 crores on the Chittaranjan Locomotive Factory and Rs. 4 crores on the Integral Coach Factory in the public sector. Thus the total investment in the railway rolling stock industry was visualised at over Rs. 11 crores during 1951–56. The actual investment likely to be achieved on the basis of the latest appraisement of the position is roughly as follows:—

	(Rs. crores)
TELCO	6.0
Chittaranjan	3·5
Integral Coach Factory	5·2
TOTAL	14·7

Out of the Rs. 6·0 crores investment by TELCO, Rs. 2·0 crores were contributed by the Government of India. This is also inclusive of the investment on their diesel truck project and the heavy castings foundry.

Action on recommendations.—(i) The manufacture of locomotives require heavy castings. The setting up of a modern steel foundry that can produce 5,000 tons per annum of large size and heavy loco-castings was, therefore, recommended. Such a foundry with an annual capacity of 3,000 tons of castings to start with is being set up at the TELCO Works. Along with the steel foundry for heavy castings, an alloy iron foundry is also being established. The construction of these foundries is progressing satisfactorily. Negotiations have been completed by TELCO with the Belgian firm of Emile Henricot for a technical aid agreement for the steel foundry project. The requisite technical aid for the alloy iron foundry will be provided by Daimler Benz. A. G. Orders have been placed for the important and long delivery items of equipment for the foundries. It is expected that both these foundries will be completed by the middle of 1957.

There is also a scheme finalised in the last year of the Plan for setting up a foundry at the Chittaranjan Locomotive Works, for which assistance from the Technical Co-operation Mission (TCM) has been arranged.

(ii) The Plan also emphasised the need for a regular and adequate flow of raw materials to the industry. Owing to the general shortage of steel the industry has not received the supplies of steel that it required but was given high priority in the allotment of steel, and the position has considerably improved during 1955-56, with arrangements for large-scale imports of steel.

II. Programme of Development in the Second Plan

Estimated requirements.—The Railway Plan lays considerable emphasis on overcoming the remaining backlog of replacements of rolling stock. In addition, the rolling stock which becomes overaged during the Second Plan period will also have to be replaced and additional railway rolling stock put into commission to meet the needs of increasing traffic on existing and new lines. Provision has been made for the purchase of railway rolling stock during the Second Plan period in numbers* indicated below:—

	B. G.	M. G.	N. G.	Total
Locomotives	1,430	853	81	2,364
Wagons (in terms of 4-wheelers)	81,454	21,772	4,021	107,247
Coaches	6,156	4,786	633	11,575

Even with this provision, a considerable number of over-age stock will still remain in service by 1960-61. Over and above the normal demands of Railways, additional requirements for diesel locomotives and wagons for movement of raw materials within the factories are expected under the expansion programme of the steel industry.

Schemes under implementation.—Compared to the First Plan, the Railway Programme for the Second Plan envisages a considerably larger addition to the rolling stock. This calls for stepping up the production of rolling stock in a big way, if imports are to be kept down to a minimum. In the matter of such vital equipment as rolling stock the achievement of self-sufficiency is of the utmost importance. The Second Plan has, therefore, made provision in the public sector for stepping up the indigenous capacity for locomotives and coaches. The facilities available in the private sector also need to be improved and augmented with a view to providing the bulk of rolling stock requirements from within the country. The development programmes envisaged are discussed below:—

(i) *Steam locomotives.*—The original target capacity of the Chittaranjan Locomotive Works and of TELCO has already been reached. It is proposed to step up the capacity of the former to 300 locomotives and that of TELCO to 100 locomotives per annum during the Second Plan period. The details relating to these expansion programmes are, however, still under consideration. With the increased output from these factories, larger supplies of locomotives are expected to be available from indigenous sources, but imports will continue during the Second Plan period.

(ii) *Wagons.*—The demand for wagons by the end of the Second Plan period is estimated at 25,000 per annum. The present established capacity in the country is in the neighbourhood of 15,000 wagons a year and arrangements are now in hand on the basis of the recommendations. of the Railway Equipment Committee to establish capacity to meet the balance of the requirements It is expected that 67 per cent of the balance will be met by the existing established manufacturers and that the other 33 per cent will be taken up by new units which have already submitted manufacturing plans. Licences have been given to the following firms for the manufacture of wagons.

Name of firm	*New or additional capacity per annum*
Textile Machinery Corporation	1,800 wagons and 600 tank wagons.
Raymon Engineering Works	3,744 wagons
B. R. Herman and Mohatta	420 wagons
K. T. Steel Industries	120 wagons

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*Subsequent to the publication of the Second Five Year Plan, slight modifications have been made in the programme of purchase of rolling stock and the figures indicated here are, therefore, slightly different from those shown in the Plan.

In addition the Binny Engineering Works, Madras have been licensed for assembly of c. k. d. wagons imported by the Railway Board. Their annual capacity is 5,000 wagons. A number of other proposals for increasing capacity is under consideration.

As a result of the above proposals it is visualised that self-sufficiency in wagons will be achieved by the end of the Second Plan period. By then, one of the most serious impediments to increased production, namely, the short supply of steel is also expected to be largely overcome. During the Plan period the import of about 20,000 wagons is visualised; production from indigenous workshops is estimated at about 87,000 wagons.

(iii) *Coaches.*—The total number of coaches required during the entire Second Plan period is estimated at about 11,575 or roughly about 2,300 coaches (including some E. M. U. stock) per annum. On the other hand, the railway workshops and the workshops in the private sector have expansion programmes which will step up the capacity for coach building to about 1,500 coaches per annum by the end of the Plan period as detailed below:—

	B. G.	M. G.	Total
	(Numbers)	(Numbers)	(Numbers)
1. Railway Workshops (including construction but excluding furnishing of I. C. F. Shells)	200	400	600
2. Hindustan Aircraft	240	..	240
3. Integral Coach Factory	350	..	350
4. Jessop & Co.	..	300	300
TOTAL	790	700	1,490

As the capacity will still be less than the assessed requirements, it is proposed to set up a M. G. Coach Building Factory to produce about 200 coaches per year during the Second Plan period and investigate possibilities of further production in the workshops or elsewhere. Details of this project are being worked out. The present capacity for furnishing integral coach shells is likely to be a bottleneck and the construction of a furnishing workshop adjoining the Integral Coach Factory, Perambur is being undertaken.

(iv) *Underframes.*—Dependent upon the extent to which additional coach building capacity can be developed about 1,650 underframes per year will be required for the manufacture of coaches estimated to be required in the next five years. The coaches produced by the integral coach factories do not require any underframes. There is indigenous capacity for the manufacture of 300 underframes per year with the Jessop & Co. at Calcutta. To meet the balance of the requirements, the Railway Equipment Committee has made certain recommendations and steps are being taken to establish capacity with the intending manufacturers who have offered to set up workshops to meet this shortfall. The following schemes have so far been licensed:

Raymon Engineering Works, Calcutta	312	underframes.
Textile Machinery Corporation, West Bengal	300	,,
K. T. Steel Industries, Bombay	120	,,

Some more schemes are under consideration of the Railway Ministry.

The present capacity for wheels, tyres and axles which are short of requirements is also being suitably enhanced. Provision for their additional production is made in the expansion programme of the Tata Iron and Steel Co. and in the new steel factory at Durgapur.

(v) *Electric multiple unit stock.*—After meeting the accumulated demands on account of replacement it is anticipated that the steady requirements of electric multiple units is likely to be 50 units per annum. Arrangements have been made to establish this capacity with the Jessop & Co., Calcutta.

Imports.—The following programme of import of rolling stock is visualised for the Second Plan:—

	1956-61			
	B. G.	M. G.	N. G.	Total
	(Numbers)	(Numbers)	(Numbers)	(Numbers)
Locomotives	523	633	81	1,237
Wagons	9,547	10,922	..	20,469
Coaches	..	..	..	..

Including the foreign exchange element for the rolling stock to be manufactured indigenously, it is expected that the demands of foreign exchange for the import programme of rolling stock would amount to Rs. 163 crores over the five year period.

Outlay under the Second Plan.—The expansion programme for the Chittaranjan Locomotive Factory during the Second Plan period is estimated to cost Rs. 5 crores. A further provision of Rs. 10 crores is made in the Plan for the furnishing units at the Perambur Coach Factory and the establishment of a M. G. Coach Factory.

The estimated investment on the locomotive expansion schemes of TELCO (this excludes the outlay on the foundry) is approximately Rs. 1 crore.

Miscellaneous.—The need for planning for self-sufficiency in rolling stock has been stressed. While imports to some extent are inevitable on account of the large arrears of replacement to be overcome in the near future, it is necessary to formulate a programme so as to meet the steady demand arising from normal replacements and such new additions as are likely to be required to cope with increasing traffic. The building of capacity for rolling stock takes time and, therefore, action has to be initiated sufficiently in advance on the basis of anticipated requirements four or five years ahead. In this connection, the suggestions and recommendations of the Railway Equipment Committee have to be carefully considered and, as far as possible, implemented. In order that the private sector may expand to the extent desired, the Railway Board should work out the details of the requirements of wagons and coaches over a reasonably long period of time and place orders on the recognised manufacturers. Greater emphasis should also be laid on progressive increase in the production of components which are now imported.

The overall supply position of steel is likely to be difficult during the first three years of the Plan after which the new steel plants and expansion projects would begin to increase the availability in the country. Special efforts need to be made during this period to meet the steel requirements of the rolling stock industry on priority basis.

The expanded production programme of the rolling stock industry will need suitable augmentation of grey iron and steel casting facilities. The establishment of a heavy steel foundry at the TELCO Works will partly meet the requirements but it will still be necessary to put up one or two more steel foundries at suitable places. The Plan includes the establishment of new facilities by the National Industrial Development Corporation and high priority has to be assigned for the implementation of this scheme.

The programme of development of the Railway Rolling Stock Industry is summarised in the following table:—

	1955-56		1960-61	
	Capacity	Production	Capacity	Production
Locomotives (Numbers)	170	179	400	400
Wagons („)	15,000	14,300	25,000	25,000
Passenger coaches („)	1,100	1,293	1,700	2,300

7. SHIPBUILDING

I. Review of Progress in the First Plan

Targets.—The Hindustan Shipyard, Visakhapatnam, the only shipbuilding unit in the country, came into the public sector with effect from March 1952, when the Government of India acquired a major controlling interest in it and began operating it in partnership with the Scindia Steam Navigation Company. A company was formed, the Hindustan Shipyard Ltd., to which the management of the shipyard was entrusted.

At the beginning of the First Plan, the Hindustan Shipyard had only two building berths each equipped to build ships ranging from 320 to 550 feet in length and from about 5,500 tons to about 15,000 tons dead weight capacity (DWT). This capacity was far below an economic size.

The Plan originally envisaged a target of 50,000 DWT to be built during 1955-56 as a result of the gradual expansion of the capacity of the Shipyard. The target of total tonnage for the five years of the Plan was estimated at 150,000 DWT (equivalent to 100,000 GRT).

The original development programme of the Shipyard was subsequently modified on the basis of the suggestions made by the French shipbuilding firm, A.C.L., with whom the Hindustan Shipyard entered into a five-year agreement for technical assistance. On the basis of the revised development programme, the capacity of the shipyard was planned to be expanded from 2½ ships of 8,000 DWT each a year to 6 ships of the same capacity. The details of this revised Rs. 1,96 lakhs development programme are given below :—

(1) Construction of 3 new building berths,

(2) Extension and installation of cranage facilities on the berths and the fitting out jetty,

(3) Extension of machine shop and installation of additional machinery therein,

(4) Installation/extension of foundry, smithy, galvanising plant, etc.,

(5) Construction of a pre-fabrication bay and new hullshops, and

(6) Acquisition of additional land and construction of roads, offices and stores buildings.

Capacity and production.—So far, the new building berths have been completed, a 35-ton travelling crane, a 125-ton hammerhead crane and two 4/8-ton level-luffing travelling cranes have been installed. The machine shop and the blacksmith shop have been extended and a number of overhead travelling cranes and new machines have been installed in these shops as well as in the hullshops, foundry and the woodworking shop. Additional land has been acquired and the new office and stores buildings are nearing completion. The erection of the pre-fabrication bay and the new hullshops and of a 45-ton travelling crane is currently under implementation.

As regards production, the Shipyard had completed and delivered by April 1956, nine vessels with a total tonnage of 70,000 DWT and one more ship of 7,000 DWT was ready for delivery in May 1956. The two ships delivered in 1955 were modern diesel engine ships of Maierform design. The ship which is ready for delivery is also of similar type. The total tonnage of ships built so far is 77,000 DWT as against the Plan target of 150,000 DWT. There is really no serious shortfall in production considering the fact that about 50 per cent more work is involved in the modern types of vessels now built in the Shipyard than in the old types which were being built at the commencement of the First Plan, *Capital and labour.*—Out of the total issued capital of Rs. 4,52·75 lakhs of the Hindustan Shipyard, the holding of the Government is Rs. 3,48·50 lakhs, while Scindia's shares are worth Rs. 1,04·25 lakhs. A further sum of Rs. 56 lakhs will be made available to the yard in 1956-57 as additional share capital raising the Government's holding to Rs. 4,04·50 lakhs.

The shipyard employs 3,399 workers (including six French workers) and 648 officers and staff (including eight French technical experts). Thus the total number of persons employed is 4,047.

Raw materials.—The principal raw materials, apart from the requirements of propelling and auxiliary machinery and navigational equipment, are steel and timber. A good percentage of the steel required is available indigenously. The categories of steel that go into the construction of a cargo vessel are plates, heavy structurals, light structurals, bars, black sheets, G.I. sheets, blooms, etc. Timber is required for sheathing decks, awnings, hatches, ceilings and bulkheads, sparring, cabin partitions, furniture, etc. About one-third of the timber, required by the Shipyard is available from indigenous sources. Some special types of timber have to be imported from Burma and Canada. The whole of the propelling and auxiliary machinery and equipment and a part of the stores are being imported. Wire ropes are at present manufactured by the National Wire Ropes Co. In regard to paints, satisfactory progress has been achieved in recent years due to the development of antifouling paints for marine use.

Demand for ships by the end of the First Plan.—At the beginning of the First Plan, India had a tonnage of 390,707 GRT. The programme under the First Plan was to add 215,000 GRT after allowing for obsolescence to the extent of 60,000 GRT thus raising the total tonnage to over 600,000 GRT. This target is likely to be achieved although it will take some time for some of the new ships to be actually put into commission. As against this additional requirement of 215,000 GRT during the First Plan period, the tonnage produced in the Shipyard is of the order of only 50,000 GRT.

II. Programme of Development in the Second Plan

Estimated requirements.—The broad objectives under the Second Plan in relation to shipping are :—

(1) to provide fully for the needs of the coastal trade with due regard to the possibilities of diverting some traffic from railways to coastal shipping,

(2) to secure an increasing share of India's overseas trade for Indian ships, and

(3) to provide the nucleus of a tanker fleet.

In view of the objectives mentioned above, it is estimated that the total tonnage required by the end of the Second Plan would be of the order of 900,000 GRT, which means an addition of 300,000 GRT to the First Plan target, exclusive of replacement of obsolete vessels estimated at about 90,000 GRT. A comparison of the tonnage position at the end of the Second Plan with that at the end of the First Plan is given in the table below :—

Gross Registered Tons

	Before the First Plan	By 1955-56	By 1960-61
Coastal and adjacent	217,202	312,202	412,200
Overseas	173,505	283,505	405,507
Tramps	Nil	Nil	60,000
Tankers	Nil	5,000	23,000
Salvage Tug	Nil	Nil	1,000
TOTAL	390,707	600,707	901,707

Target of tonnage expected to be turned out by the Shipyard.—As against the present delivery of 2 ships per annum, it is envisaged that on the completion of the first phase of development, six ships of the old type or 4 of the modern type now being built at the yard will be delivered annually. In terms of tonnage this will amount to 75,000 to 90,000 GRT for the five years of the Second Plan. This, evidently, is lower that the First Plan target of 100,000 GRT. This low target is explained by the fact that more work as well as longer time is involved in the new types of ships planned to be constructed during the Second Plan period than in the old types constructed during the First Plan period. It is envisaged further that on the completion of the second phase of development, the production target would be raised to 8 to 12 ships per year.

Development of the Shipyard.—As already explained, the programme of development will be carried out in two phases. In the first phase, a dry dock estimated to cost about Rs. 2,15 lakhs will be constructed on which a beginning has already been made. During the First Plan period an expenditure of about Rs. 1 lakh is estimated to have been incurred on this project. The construction of this dock is expected to reduce to a certain extent the expenditure on shipbuilding at the Visakhapatnam Shipyard apart from providing dry dock facilities for cargo vessels and tankers expected to reach the port in connection with the operation of the Caltex petroleum refinery.

To achieve a production target of 8 to 12 ships per year in the second phase of development, a further increase in the capacity of the hullshop and additional cranage facilities and some improvements in existing facilities are envisaged. For securing this increase in capacity, it will not be necessary to increase the berths, since the period during which the ship under construction is expected to be in the berth is proposed to be reduced considerably through installation of pre-fabrication facilities in the workshops on the shore.

A provision of Rs. 1,00 lakhs has been made for these schemes of expansion in the Second Plan. The actual implementation of this programme to raise the capacity to 8 to 12 ships will be taken up after a review during 1957 of the position relating to the anticipated offtake of ships since the expansion would be justified only if there is an assured offtake for the expanded production.

The overall provision made for the Hindustan Shipyard in the Second Plan is indicated below :—

	(Rs. lakhs)
(1) Spill-over of expenditure from the First Plan	55·0
(2) Last instalment payable to Scindias in 1956-57	33·8
(3) Construction subsidy on ships built at the shipyard	5,00·0
(4) Further expansion of the shipyard to build 8 to 12 ships	1,00·0
(5) Construction of dry dock	2,14·0
TOTAL	9,02·8

The question of further augmenting the capacity for building ships has been examined. Further expansion can be secured:—

(*a*) through further increasing the capacity of the Visakhapatnam Shipyard, and

(*b*) through the establishment of a second shipyard.

As regards (*a*) it is thought that further concentration of shipbuilding activities at Visakhapatnam may not be necessary since the shipyard can be expected to reach an economic level of production when it achieves a capacity to turn out 8 to 12 ships per annum. The establishment of a second shipyard would be justified if the offtake of ships is likely to be sufficiently high. It is envisaged that conditions of offtake will be favourable under the Third Plan for the following reasons :—

(*a*) The provision for expansion of shipping in the public sector as well as the private sector will have to be substantially higher in the Third Plan, and

(*b*) The cost of ships can be expected to come down with supplies of steel at reasonably low prices arising from the increased availability of domestic steel as well as the availability of plates of the required specifications.

In view of the desirability of establishing a second shipyard under the Third Plan, it is necessary to initiate sufficiently in advance the steps for the training of personnel and for the preparatory work including selection of an appropriate site for the yard. A token provision of Rs. 75 lakhs has been made in the Second Plan for this purpose in addition to Rs. 9,02·8 lakhs referred to earlier.

Miscellaneous:

(1) *Standardisation of ships to be built by the Hindustan Shipyard.*—As further expansion of the shipyard depends upon the increased offtake of ships by the shipping companies, which in turn depends much upon the price payable by the shipowners, standardisation, which contributes greatly to reducing the cost of ships, is a matter of vital importance for the further progress of the shipbuilding industry. Ships required for different runs could be standardised after full investigation of the needs of the trades on that run. This would not only mean cheaper ships, but quicker delivery and better workmanship due to repeated production and would save money both for the shipowners and for the public exchequer.

Until the Shipyard gains more experience, it is essential to concentrate only on three or four standard types of ships at least for some years to come. The success, however, of the standardisation scheme is largely dependent on the whole-hearted co-operation of the shipowners. It may be stressed in this context that the shipowners should in the overall interest of the country keep this point in view in placing their orders and thus contribute to the progress of the shipbuilding industry which will ultimately be conducive to the prosperity of the shipping industry.

(2) *Indian content of the Visakhapatnam-built ships.*—The scope for fabricating a large number of components and parts required for the construction of ships is reported to exist in a number of workshops in the Calcutta area. However, so far, there are no facilities for the manufacture of heavy castings required by the Hindustan Shipyard. The heavy steel foundry under construction by the Tata Locomotive and Engineering Co., Jamshedpur and similar foundries proposed for establishment at Chittaranjan by the Ministry of Railways and at other location/locations by the National Industrial Development Corporation should enable the Hindustan Shipyard to increase the Indian content of the Visakhapatnam-built ships. Efforts should continuously be made to utilise the indigenous capacity fully for the manufacture of different parts hitherto imported. In order to enable substantial progress being made in the direction of self-sufficiency, a project for the manufacture of heavy marine diesel engines by the Hindustan Shipyard is also envisaged in the Second Plan. The resources required for it will have to be provided at the appropriate stage.

8. AUTOMOBILE AND ALLIED INDUSTRIES

The industries dealt in this section cover (A) automobile and ancillary industries, and (B) allied industries like autocycles, scooters, motor cycles, auto-rickshaws and three-wheeled cars.

A. AUTOMOBILES

I. Review of the Progress in the First Plan

Targets.—The demand for motor vehicles was estimated to be about 25,000 at the beginning of the First Plan. No appreciable increase of this figure was expected by the end of the Plan period.

In 1950-51 there were 12 firms engaged in the production of automobiles. All of them started as assemblers of vehicles imported in c.k.d. condition. Five of them had plans to undertake manufacture of components initially and complete vehicles later on; but only two firms namely, the Hindustan Motors, Calcutta and the Premier Automobiles, Bombay, had actually made some progress at the beginning of the Plan.

The targets of capacity and production envisaged in the First Plan were as follows :—

	1950-51		1955-56	
	Assemblers	Manufacturers	Assemblers	Manufacturers
Number of units	10	2	..	2
Rated capacity (Numbers)	41,700	30,000	..	30,000
Actual production (Numbers)	12,442	4,077	..	30,000

Capacity.—In 1953 the Tariff Commission submitted a report to the Government on the future development of the automobile industry. The Government decided to implement the recommendations of the Commission. This meant that only firms with definite manufacturing programmes should be allowed to continue in the industry and that the assembly operations of those without manufacturing programmes should cease within a period of three years. Accordingly, plans put forward by various firms for the progressive manufacture of various types of automobiles were scrutinised by the Government and by 1954, six firms were licensed to manufacture certain specified types and makes of vehicles as shown below:—

Name of the firm	Location	Vehicle approved				Present rated manufacturing capacity on single shift (Numbers)
		Cars	Type	Trucks	Type	
1. Hindustan Motors	Calcutta	1. Hindustan 14 (Land Master).	Light	Studebaker	Petrol	9,000*
		2. Studebaker.	Heavy			
		3. Morris Minor.	Baby			

* The assembling capacity of the Hindustan Motors is 18,000 vehicles on single shift operation and on this basis the overall rated capacity for assembly of automobiles is 38,000 per annum.

Name of the firm	Location	Vehicle approved				Present rated manufacturing capacity on single shift (Numbers)
		Cars	Type	Trucks	Type	
2. Premier Automobiles	Bombay	1. Dodge/De Soto/Plymouth.	Heavy	Dodge/De Soto/Fargo.	Petrol	5,000
		2. Fiat 1100	Light			
3. Standard Motor Products of India.	Madras	1. Standard Vanguard.	Medium			
		2. Standard 10	Baby			3,000
4. Ashok Leyland	Madras	..	..	Leyland (5 tons and above)	Diesel	3,000
5. Tata Locomotive and Engineering Co.	Jamshedpur.	..	..	Tata Mercedes Benz.	Diesel	6,000
6. Mahindra and Mahindra	Bombay	..	..	Willy's Universal Jeep.	Petrol	3,000
						29,000

Licences for the import of components and allocations of the necessary foreign exchange were granted to these firms in accordance with the requirements of their approved manufacturing programmes, while firms without manufacturing programmes, had to wind up their assembly operations and close down.

Firms with approved manufacturing programmes were expected in due course to manufacture all the items normally turned out by automobile manufacturers *viz.*, engines, transmission, rear axle assembly, front axle and chassis frame. Further, these firms were expected to manufacture in the course of three years from the date of commencement of their respective programmes 50 per cent of the c.i.f. value of the c.k.d. packs. Appreciable progress has been made by some of these units in their manufacturing programmes. The Hindustan Motors have reported to have achieved an indigenous content of nearly 65 per cent in their "Land Master" cars and the Premier Automobiles about 50 per cent in the "Dodge" group of trucks. The present stage of development of the more important models of vehicles covered by the programme is as under :—

	Items manufactured
Hindustan Land Master cars . . .	(1) Complete engines with the exception of electrical accessories, fuel pumps, carburettors, air cleaners, starter rings, gaskets and bearings. (2) Complete gear boxes with the exception of oil seals and bearings. (3) Rear axle including differential with the exception of oil seals and bearings. (4) Front suspension with the exception of oil seals and bearings.
Standard Vanguard cars . . .	Complete engines with the exception of electrical accessories, fuel pumps, carburettors, gaskets, bearings, air cleaners, valves and connecting rods.

Dodge/De Soto/Plymouth cars	Certain components *viz.*, cylinder block, cylinder head, connecting rods, flywheel, intake manifold, water pump, crankshaft, crankshaft bearing caps, assembly mufflar and exhaust pipe, tailpipe radiator core.
Dodge/De Soto/Fargo trucks	(1) Complete engines with the exception of electrical accessories, fuel pump, carburettors, gaskets and bearings. (2) Complete gear boxes with the exception of oil seals and bearings. (3) Propeller shaft and universal joint. (4) Chassis frame including side members.

All the manufacturing units obtain from within the country items such as rubber components, including tyres and tubes, batteries, upholstery material, body panels for commercial vehicles, cabs, brake fluids and sparking plugs and a number of other components.

The production of cars is concentrated in three firms *viz.* the Hindustan Motors (light, heavy and baby models), the Premier Automobiles (light and heavy models) and the Standard Motor Products of India (medium and baby). Petrol trucks are turned out by the first two firms while diesel trucks are being produced by the Ashok Leyland and the Tata Locomotive and Engineering Co. The manufacture of jeeps is concentrated in one firm, namely Mahindra and Mahindra. "Dodge" and "Studebaker" trucks fitted with diesel engines are also being produced.

The present rated manufacturing capacity of all the manufacturing firms is about 29,000 vehicles per annum of all types. Since most of the machinery installed by these units is for the manufacture of more than one variety of vehicle components, the production of which is spread over a number of years, the machines will not be utilised to their full capacity in the initial stages.

Production and sales.—The number of cars and trucks produced and sold during the Plan period was as follows :—

Year	Production (Numbers)			Sales (Numbers)		
	Cars	Trucks	Total	Cars	Trucks	Total
1951	12,385	9,884	22,269	12,597	9,796	22,393
1952	6,952	8,339	15,291	8,212	7,503	15,715
1953	4,936	8,990	13,926	5,000	4,400	9,400
1954	5,435	9,027	14,462	5,806	8,007	13,813
1955	10,297	12,787	23,084	10,166	12,899	23,065

The production as well as sales of automobiles have increased progressively since 1953. The production figures for the calendar year 1956 may well reach the target of 30,000 vehicles set for the last year of the Plan.

Demand.—The aggregate demand for motor cars and trucks was not expected to increase appreciably by the end of the Plan. This has been corroborated by actual figures. While the offtake of cars has declined in 1955 as compared to 1951, that of trucks has risen.

Imports and exports.—The number and value of motor vehicles imported since 1950-51 are as follows :—

Year	Motor cars including taxi cars (Numbers)	Motor omnibuses, motor vans and lorries (Numbers)	Total (Numbers)	Value (Rs. lakhs)
1950-51	8,433	4,903	13,336	6,37
1951-52	9,963	4,712	14,675	7,76
1952-53	5,164	3,637	8,801	5,93
1953-54	5,816	4,189	10,005	6,08
1954-55	10,546	4,516	15,062	10,23
1955-56 (Nine months April to December).	8,021	6,249	14,270	9,37

Except for a very limited number of motor cars imported complete, all the vehicles imported are in c.k.d. condition. Vehicles are imported with a varying proportion of different components according to the needs of the manufacturers who assemble them into complete vehicles making use of such components as are produced by them or are available locally. The imports broadly follow the pattern of indigenous production, recording a substantial decline in 1952-53 and 1953-54 and a progressive increase since then. The imports in 1955-56 are estimated to be higher than those in 1954-55, judging from the figures relating to nine months from April to December, 1955.

Exports have been negligible during the Plan period.

Prices.—For the quick development of the automobile industry, it is essential to bring down prices. One measure taken towards this end was the reduction of the customs duty on several components in 1953 so that the average duty on a vehicle imported in the c.k.d. condition did not exceed 40 per cent *ad valorem*. Since then, other steps have been taken; the margin of profit allowed by the manufacturers to the dealers and the mark-up on spare parts prices over the landed cost have, in consultation with the industry, been reduced.

In spite of the steps hitherto taken, the prices have continued to remain high and the manufacturers have been asking for an increase in the selling prices of the vehicles on the ground that (*i*) there has been an all-round increase in automobile prices in other countries and they have to pay higher prices for the imported raw materials and components, (*ii*) the manufacturing costs of components in the country are often higher than the landed cost of the components which they replace and (*iii*) their overheads are high on account of the small turnover. In view of the importance of the issue, the Government have in 1955 requested the Tariff Commission to give their recommendations on (*i*) what should be the fair ex-factory and selling prices of the various types of motor vehicles manufactured in the country; and (*ii*) how the prices should be adjusted from time to time as more and more components begin to be produced in the country in accordance with the approved manufacturing programmes of the several units.

Raw materials.—The principal raw materials required by the automobile industry cover a wide range of ferrous and non-ferrous materials, rubber parts, glass, timber, plastics and paints. The present position as regards the availability of these from indigenous sources is as follows :—

Raw materials	Available locally	Imported
1. Iron and steel castings	1. Grey iron castings . . . . 2. Malleable steel castings of ordinary quality. 3. Steel castings of low quality	High quality grey iron castings
2. Forgings	Small and medium drop forgings	Big drop forgings
3. Steel	1. Mild steel and rolled sections . 2. Round bars of mild steel . . . 3. Alloy steel in small quantities . 4. Hot rolled sheet steel, medium thickness and quality. 5. High silicon sheet metal for electric machines. 6. Welded steel tubes . . .	1. Alloy steel and rolled sections 2. Round bars of alloy steel 3. Bright bars 4. Free cutting steel 5. Cold rolled steel strips. 6. Cold rolled thin metal steel with deep drawing quality. 7. Strips for high quality steel tubes. 8. Thin seamless steel tubes 9. Terne plates for production of fuel tanks.
4. Non-ferrous metals . . .	1. Aluminium castings . . 2. Zinc die castings.	Thin rolled sheets and thin seamless tubes of brass and copper.
5. Rubber parts	1. Tyres and tubes . . . 2. Fan belts. 3. Foam rubber 4. Steel backed rubber mountings 5. General rubber parts of water resistant quality.	Oil and fuel resistant rubber and rubber brake hoses.
6. Glass	..	Plate glass, toughened or laminated safety glass.
7. Paints	All types.	..
8. Ball and roller bearings . .	Ball bearings	Roller and taper roller bearings
9. Other materials . . .	Timber, textile fabrics, upholstery materials, artificial resin, bolts, nuts, screws, washers, spring washers, keys.	

The approximate quantity of the principal raw materials estimated to have been consumed by the six manufacturing firms during 1955 is as follows :—

Steel	36,000	tons
Cast iron	15,000	tons
Copper	120	tons
Brass	120	tons
Rubber tyres and components	6,000	tons
Leather	6	lakh sq. ft.
Asbestos	100	tons.

Investment.—Out of the present manufacturing firms, five were in existence at the beginning of the First Plan. Their total capital investment then was nearly Rs. 8 crores inclusive of working capital. The investment of the six approved manufacturers at the end of December 1955 amounted to nearly Rs. 17·3 crores comprising Rs. 5 crores of plant and equipment, Rs. 2·4 crores of buildings and facilities and Rs. 9·9 crores of working capital. The total additional investment (productive capital) made in the automobile industry during the First Plan is estimated to be about Rs. 8 crores.

Employment.—The total number of persons employed in the 12 units which were in existence at the commencement of the Plan was about 8,000. The labour employed by the six manufacturing firms at the end of December 1955 was as follows :—

Unskilled	2,233
Skilled	3,135
Semi-skilled	2,249
Supervisory	527
Clerical	908
Others	1,222
TOTAL	10,274

Problems of the industry.—One of the problems faced by the industry is the low demand for vehicles of all types. The total number of vehicles on the road in the country during the last quarter of 1954 was estimated at 353,000. Considering the size of the country, its road mileage and population, this is too small a number. The number of vehicles per mile of surfaced roads in India works out to 3·18 as compared with 17·44 in Canada, 18·07 in the U.K. and 23·77 in the U.S.A., and the number of vehicles per head of population is only about one to 1,000 in India compared with one to 15 in the U.K., 4·9 in Canada and 3·1 in U.S.A. In the last few years, the number of vehicles in India has not expanded at a rate commensurate with the growth of the general economic activity in the country. Thus, in the four years from 1950 to 1954 the number of vehicles in the country increased from 294,727 to 353,000, *i.e.* by 19·77 per cent. Because of the low demand for vehicles in the country, the industry is not in a position to step up production and thus reduce the manufacturing costs. The principal factors (affecting demand) are said to be (*i*) the high level of taxation; (*ii*) restrictive licensing policies; (*iii*) absence of sufficient lengths of good roads; (*iv*) uncertainty created by the fear of nationalisation; and (*v*) lack of proper organisation in the motor transport industry. Substantial progress has been made in the First Plan period on the development of roads in the country and the Second Plan provides for still larger programmes in this respect. The other obstacles in the way of rapid development of road transport have also been engaging the attention of the Government. An inter-departmental Study Group went into the question of development of road transport recently and action is being pursued on some of its recommendations relating to the liberalisation of licensing policies and avoidance of double taxation on vehicles operating on inter-State routes. The Central Government propose taking permissive powers to regulate inter-State transport under the Motor Vehicles Act. Action has also been taken to regulate on a phased basis the nationalisation programmes in States. The Planning Commission suggested to the State Governments that the programmes for taking over the passenger road services should be suitably phased and the periods of validity of permits granted to the private operators should be liberalised according to the provisions of the Motor Vehicles Act, depending upon the programmes of expansion of the nationalised services. The Commission also recommended that the nationalisation of goods transport services should be postponed until the end of the Second Plan and private operators should be encouraged to form viable units. These measures are expected to assist substantially the road transport industry. The recommendations of the Tariff Commission in regard to the price structure in the automobile industry should also help the growth of the industry on sound lines.

AUTOMOBILE ANCILLARY INDUSTRIES

Capacity.—At the commencement of the Plan, only the nucleus of an ancillary industry existed in the country. The Tariff Commission (1953) recommended that for a healthy and balanced development of the automobile industry, ancillary industries should be developed for the manufacture of important components such as carburettors, fuel pumps, fuel filters, air cleaners, clutches, etc., in technical collaboration with foreign firms and that the number of units to be set up and the total capacity of each main component should be correlated with the actual or potential demand. It was also suggested that automobile manufacturers should purchase the products of ancillary industries in India for use as original equipment. Accordingly during the years 1954 and 1955 a number of ancillary units were approved/licensed for the manufacture of a variety of component parts. There are at present 20 important units which have been approved/licensed and of them 10 have already gone into production. Most of the remaining units are expected to commence production during the initial stages of the Second Plan period. Some of these have secured technical collaboration with reputed firms in the United Kingdom, Germany and Sweden. A list of these firms and the component parts manufactured or expected to be manufactured by them is given in the Annexure. The capacity of these units is expected to be adequate to meet the requirements of the industry.

Production.—Appreciable progress has been made in the production of essential components in 1954 and 1955. The important components turned out and their number are shown in the following table :—

Items manufactured (Numbers)	1951	1952	1953	1954	1955	REMARKS
1	2	3	4	5	6	7
1. Pistons	..	746	65,497	114,223	132,042	Production of pistons commenced only in November 1952.
2. Piston rings . . .	1,396,085	1,425,519	1,376,399	1,575,668	1,917,762	

1	2	3	4	5	6	7
3. Cylinder lines (wet and dry)	..	..	17,318	33,856	65,177	
4. Gudgeon pins	..	..	..	22,790	133,326	Gudgeon pin production commenced in October 1954.
5. Tyre inflators	..	9,814	36,814	12,573	16,554	
6. Fuel injection pumps	..	..	..	3,938	11,813	Production of fuel injection pumps and fuel injection nozzle holders commenced in June 1954.
7. Fuel injection nozzle holders	..	..	..	3,813	14,524	
8. Spark plugs	..	..	24,108	112,863	531,884	
9. Screw jacks	..	..	..	4,984	5,909	
10. Automotive diesel engines	..	..	..	..	3,875	
11. Valves	..	..	..	..	..	Figures are not available as these items are made by the parent firms to meet their own requirements.
12. Shock absorbers	..	..	..	..	..	
13. Radiators	..	..	..	..	..	

Except for alloy steel and body panels for cars for the production of which no programme is at present under contemplation and for major electrical accessories such as dynamos, starter motors and instruments, schemes for the manufacture of which are under active consideration, all other parts are produced or are shortly expected to be produced locally.

The ancillary schemes licensed for the distinct production of valves, gaskets and oil seals, brake linings and clutch discs, clutch and hydraulic brake assemblies, shock absorbers, and electric horns have not gone into production as yet.

Capital investment and labour.—Precise information regarding the capital invested by all the ancillary units is not available. The approximate total capital invested till now by the important firms connected with the ancillary industries is as follows :—

	(Rs. lakhs)
Paid-up capital	2,84
Plant and equipment	1,03
Building and other facilities	48
Working capital	51

As most of these firms came into existence after 1950, a major portion of the above capital has been invested during the Plan period. The industry employs about 1,000 workers of all types at present.

II. Programme of Development in the Second Plan

Estimated requirements.—The demand for an item like automobiles at the end of a five year period is difficult to forecast with precision since it is influenced by several factors on some of which it has not so far been possible to take a long-term view extending over a quinquennium. The major factors which influence offtake are (*a*) increase in the size of the higher income groups, (*b*) taxation policies at the Central and State Government levels, (*c*) price of vehicles and extension of hire-purchase system and other devices to stimulate sales, (*d*) shortages in the availability of alternative facilities for transport of commodities and for passenger traffic, and (*e*) extension of State activities through nationalised road transport. On the basis of an assessment made in the latter half of 1955, the demand for automobiles in 1960-61 was placed at 57,000 vehicles consisting of 12,000 cars, 40,000 trucks, omnibuses, etc., and 5,000 jeeps and station wagons. While the estimated demand for cars in 1960-61 might seem to provide for an expansion of 50 per cent over the offtake in 1954, it hardly represents more than a 20 per cent increase in comparison with the sales in the following year when there was a spurt in demand for automobiles. The Ministry of Commerce and Industry have recently suggested that the overall requirements for automobiles should be visualised by 1960-61 at 65,000 vehicles on the basis of a 100 per cent increase in the demand for cars over sales in 1955, *i.e.* offtake of 20,000 cars by 1960-61, as against the earlier estimate of 12,000 cars. It is felt by the Planning Commission that the trends of demand should be watched for some more time and that the estimate of 57,000 vehicles by 1960-61 and the break-up thereof could, in the meanwhile, be made the basis for the development programme. The examination of the production costs, and other aspects of the automobile industry undertaken by the Tariff Commission at the instance of the Ministry of Commerce and Industry would provide in the near future valuable data for a review of the assessment of demand.

Targets of capacity and production.—Having regard to the heavy investments required in the automobile industry, capacity has to be planned on the basis of multiple-shift operation of plant facilities, wherever possible, for achieving optimum results. The existing six manufacturers are expected to implement their phased programmes according to schedule and turn out the requisite components necessary for achieving 80 per cent indigenous content. As regards production, the target is visualised at 57,000 vehicles by 1960-61.

The development programme for the automobile industry should be reviewed in the light of the recommendations of the Tariff Commission on the issues referred to it and other relevant data.

Investment.—An overall investment of about Rs. 16 crores inclusive of requirements for replacements is estimated to be necessary during the Second Plan period for the implementation of the expansion programme of the automobile industry in accordance with the targets envisaged.

Employment.—The number of workers employed is expected to reach the level of 14,000 of all categories at the end of the Plan period.

Raw material requirements.—It is not possible to give precise requirements of raw materials during the period of the Second Plan. Capacity for high quality grey iron castings for cylinders and big drop forgings is under development. Schemes for producing oil and fuel resistant rubber and rubber brake hoses and safety glass are envisaged in the Second Plan period. It is considered that it will be necessary to continue the import of cold rolled sheets, steel sheets and steel strips even at the end of the Plan period. Except for alloy steel, and copper and brass strips, it is expected that by the end of the Plan, all other important raw materials will be available locally in the desired quantity and quality.

Imports.—As against an average of 22-25 per cent by value of indigenous components in the vehicles now produced, about 80 per cent is envisaged by 1960-61. As a result, although the demand for all types of vehicles may increase, the total value at current prices of imports in c.k.d. condition is likely to be only three-fourths of the present level of about Rs. 10 crores. With the development of most of the essential raw materials, mentioned in the previous paragraph, substantial reduction in imports of these is also expected.

Ancillary industries.—Ten firms which are in the stage of development at present are expected to commence regular production in the initial years of the Second Plan period. When these units are in full production, most of the components are expected to be available in sufficient quantities and quality, both to meet the need of the manufacturers for original equipment and also for the replacement market. An additional investment of Rs. 1·5 to Rs. 2 crores is likely to be incurred on the development of ancillary industries during the Second Plan. The industries are expected to offer employment to 1,500 persons by the end of the Plan.

The following table summarises the development programme of the automobile industry during the period of the Second Plan:—

	1955-56	1960-61
1. Number of manufacturing units	6	6
2. Annual rated capacity on single shift (Numbers)	29,000	29,000
3. Estimated production (Numbers)	25,000	57,000
4. Consumption (Numbers)	23,000	57,000

ANNEXURE

Important automobile ancillary manufacturing units in India

Name of units 1	Items manufactured, or proposed to be manufactured 2
(a) Units in production	
1. India Pistons, Madras	1. Pistons 2. Piston rings 3. Cylinder liners (wet and dry) 4. Gudgeon pins.
2. Union & Co. Accessories, Madras	1. Tyre inflators 2. Electric horns (not yet started) 3. Ignition coils (Do.) 4. Condensers (Do.)
3. Motor Industries, Bangalore	1. Fuel injection pumps 2. Nozzle holders 3. Spark plugs.
4. Auto Accessories (India), Bombay	Spark plugs.
5. Kirloskar Oil Engines	Thinwall/shell bearings.
6. H. J. Leach & Co., Bombay	Filter elements for air, oil and fuel filters.
7. Malleable Iron and Steel Co., Bombay	Chassis components.

1	2
8. Metropolitan Spring, Bombay . .	Leaf springs.
9. Canara Workshops, Mangalore . .	Leaf springs.
10. Simpson and Co., Madras	Automotive diesel engines.
(*b*) *New units not yet started production*	
1. Escorts (Agents), New Delhi	1. Piston rings 2. Cylinder liners (wet and dry) 3. Gaskets 4. Oil seals
2. New International Motors, Ahmedabad .	1. Valves 2. Gaskets
3. Asbestos Magnesia and Friction Materials, Bombay.	1. Brake linings 2. Clutch discs.
4. India Radiators, Bangalore . . .	Radiators.
5. Hydraulics, Madras	Shock absorbers.
6. Fuel Injections, Bombay	1. Fuel injection pumps 2. Nozzle holders.
7. Automobile Products of India, Bombay .	1. Clutch and hydraulic assemblies 2. Brake and clutch linings 3. Automobile diesel engines.
8. Rubberex Industries, Bombay . . .	Vulcanised rubber and insulated flexible cord.
9. Engine Valves, Madras	Valves and tappets.
10. Acme Manufacturing Co., Bombay . .	Valves.

B. ALLIED INDUSTRIES

I. Brief Survey of the Industries

Motor Cycles and Scooters

The manufacture of autocycles, scooters, motor cycles, auto-rickshaws, etc., is an activity somewhat allied to production of automobiles. At the commencement of the First Plan there were no firms engaged in the manufacture of these types of vehicles. Domestic demand was met by imports which have been as follows during recent years:—

Imports of motor cycles and scooters

Year	Quantity (Numbers)	Value (Rs. lakhs)
1951-52	3,612	48·4
1952-53	2,403	37·1
1953-54	4,101	63·7
1954-55	2,742	34·4
1955-56 (Ten months, April—January)	5,160	60·9

As regards auto-rickshaws and auto-attachments, licences for civilian imports were issued as under :—

Year	Auto-rickshaws (Rs. lakhs)	Auto-attachments (Rs. lakhs)
1953	11·7	8·7
1954	33·0	10·1
1955 (January—June)	23·0	4·1

Schemes implemented under the First Plan : (*i*) *Motor cycles.*— The Madras Motors, Madras [since renamed Enfield (India) Ltd.] were granted a licence in 1954 for the manufacture of motor cycles in India in collaboration with the Enfield Cycle Co., England, on the basis of a phased manufacturing programme spread over five years. The firm are to manufacture 'Royal Enfield" motor cycles in two sizes of 150 c.c. and 350 c.c. in their plant to be equipped for a total installed capacity of 5,000 per single shift per annum. The factory commenced production in May 1955 and turned out 419 motor cycles up to December 1955. The capital investment on this unit which currently provides employment to about 155 persons is estimated at about Rs. 26 lakhs. The firm has recently been licensed for the manufacture of 1,800 three-wheeled motor-cycle chassis per annum.

(*ii*) *Scooters.*—Until quite recently scooters were not introduced in the Indian market in any considerable number and, therefore, it is not possible to estimate the present or future demand with some degree of precision. The Automobile Products of India, Bombay, have been permitted to manufacture annually 6,000 "Lambretta" scooters of 150 c.c., 125 c.c., and 48 c.c., and three-wheeled transport vehicles in collaboration with Messrs. Innocenti of Italy. The programme of manufacture is scheduled to be completed in a period of 5 years. The firm went into production in August 1955 and turned out 536 scooters during the year. About 272 persons were employed in this plant in December 1955.

To encourage the development of a bigger market for motor cycles and scooters, the Government reduced the import duty in 1955 from 47·25 per cent standard to 35 per cent standard (39 3/8 per cent preferential to 27·5 per cent preferential). In the case of approved firms one more step was taken and that was to reduce the import duty on c.k.d. packs to 15 per cent standard (7·5 per cent preferential). Wheels, handle bars, saddles for scooters and frames, petrol tanks, silencers and pistons for motor cycles are excluded from the purview of this reduction.

II. Programme of Development in the Second Plan

A few of the major items falling under allied industries are discussed below with reference to projects approved for implementation and levels of estimated requirements.

(*a*) *Motor cycles and Scooters.*—The demand for motor cycles at the end of the First Plan is estimated at 5,000 per annum and it is anticipated to rise to about 11,000 by 1960-61 inclusive of scooters. It is envisaged that the demand for motor cycles and scooters could be met if necessary by stepping up through multiple-shift operation, the output of the existing plants. No appreciable increase in capital or labour is expected for achieving the target of 80 per cent indigenous content as regards motor cycles and 90 per cent indigenous content in respect of scooters.

(*b*) *Trailers.*—Both automobile and tractor drawn trailers are being manufactured in India. The six firms engaged in the manufacture and their annual capacity on single shift are as under :—

	(Number)
1. Ganeshdas Ramgopal and Sons, Lucknow	192
2. Mackenzies Ltd., Bombay	120
3. Mahindra and Mahindra, Bombay	2,040
4. Simpson and Co., Madras	600
5. Indian Galvanising Co. (1926) Ltd., Calcutta	1,800
6. K. T. Steel Industries, Bombay	480
TOTAL	5,232

Licences under the Industries (Development and Regulation) Act, 1951 have been issued to (*a*) Mahindra and Mahindra, Bombay for expansion of their capacity from 2,040 numbers per annum to 3,780 numbers per annum and (*b*) the East Asiatic Co., Bombay, for manufacture of trailers for a capacity of 60 units per annum. A few other firms have applied for licences for the manufacture of trailers under the Act; their cases are at present under consideration.

The manufacturers are producing trailers according to demand; the level of production can be stepped up if there is sufficient demand. The total labour employed in this industry at the end of December 1955 was about 1,600.

9. BALL AND ROLLER BEARINGS

I Review of Progress in the First Plan

Targets.—At the beginning of the First Plan, there was only one unit namely the National Bearing Company, Jaipur, engaged in the manufacture of ball bearings. This factory, which started production only in August 1950, had a rated capacity of 600,000 pieces per annum on a single shift basis. The Plan envisaged that the demand for ball bearings by 1955-56 would be of the order of 1·2 to 1·3 millions and that it might be possible to meet this demand by operating the available plant more than one shift. The question, therefore, of establishing any further unit for the manufacture of ball bearings was left to be considered after two or three years depending upon the performance of the existing unit.

Capacity and production :

Ball bearings.—No new factory has been set up during the Plan period so that at present there is still only one plant producing ball bearings. Considerable progress has, however, been made by this plant in increasing the output as well as the range of production. Substantial increase in production over and above the rated capacity has been achieved by working more than one shift. Moreover, the range of sizes produced has increased from 19 in 1950 to 100 in 1954-55 and to 129 by the end of the First Plan. The bulk of the production, however, does not extend beyond 3" bore bearings. The increase in production of ball bearings recorded during the five years of the Plan can be seen from the following table:—

	Production (Numbers)
1951-52	249,661
1952-53	496,106
1953-54	691,607
1954-55	669,580
1955-56 (Ten months, April to January)	815,367
1955-56 (Estimated)	889,500

The expansion programme of the National Bearing Company which is already under implementation, includes the manufacture of roller bearings and taper roller bearings. They have already commenced the manufacture of roller bearings of 21 different sizes and axle boxes of 12" diameter.

Steel balls.—The National Bearing Company have also a considerable capacity for the manufacture of steel balls required by the cycle industry. The annual rated capacity of the firm on a single shift basis is about 700,000 gross steel balls. The actual production of this unit rose from about 4 lakh gross in 1951 to about 16 lakh gross in 1955 of sizes up to 9/16" diameter.

Besides the Nationl Bearing Company, the New Haven Steel Ball Corporation, Bombay, has also started manufacturing steel balls since November 1951. The installed capacity of this firm on a single shift basis is 500,000 gross steel balls.

The above-mentioned two units producing steel balls have thus a total annual rated capacity of about 12 lakh gross on a single shift basis. The total actual production of steel balls of these two units for the last five years has been as given below :—

	Production (gross)
1951	749,926
1952	1,397,935
1953	1,461,659
1954	2,242,494
1955	2,230,679
1956 (Estimated)	2,300,000

Imports.—Ball and roller bearings are allowed to be imported under a quota system, but taper roller bearings and their components are under O.G.L.

Statistics of the value of import of ball bearings and steel balls, as published in the Foreign Trade and Navigation Accounts of India, since April 1953, are given below :—

	Imports (value in Rs. lakhs.)			
	1953-54	1954-55	1955-56 (April to January)	1955-56 (Estimated)
Ball bearings				
Up to 1" bore diameter	11·08	9·02	4·27	5·00
Between 1"x 2" bore diameter	40·84	37·97	15·69	19·00
Above 2" bore diameter	29·04	32·74	9·59	9·00
TOTAL	80·96	79·73	29·55	33·00
Steel balls				
Up to 9/16" diameter	0·37	0·66	N.A.	
Above 9/16" diameter	0·90	0·75	N.A.	
TOTAL	1·27	1·41	N.A.	

Consumption.—It was estimated that by 1955-56, the requirements of ball bearings would be of the order 1·2 to 1·3 millions.

The import statistics on ball bearings are indicated only in terms of value and do not show the quantity of imports in physical terms. It is, therefore, difficult to arrive at a precise estimate of the actual consumption of ball bearings of different types. The overall consumption in 1955-56 is roughly estimated to be about 1·2 million bearings.

Capital and labour.—The total block capital investment of the two firms manufacturing ball bearings and steel balls is about Rs. 75 lakhs. The total working personnel numbers about 750.

Tariff protection.—As the ball bearings and steel balls industry was experiencing difficulties due to severe foreign competition, the Government of India were requested to assist the industry by restricting imports and levying a high protective duty on ball bearings and steel balls imported into the country. The question of protection or assistance was referred to the Tariff Board for investigation. The Tariff Board was succeeded by the Tariff Commission, who enquired into the case and made certain recommendations for the protection of the industry, the main points of which were as follows:—

(*a*) Protection to the ball and roller bearings industry should be granted for a period of two years.

(*b*) The existing revenue duties on ball bearings not exceeding 2" bore diameter adapted for use as parts and accessories of motor vehicles other than motor cycles and motor scooters should be converted into protective duties at the same rates.

(*c*) Ball bearings of all kinds not exceeding 2" bore not otherwise specified should also be brought under the scheme of protection and should be assessable to a protective duty of 94½ per cent *ad valorem.*

(*d*) The rate of duty on adapter bearings not exceeding 2" bore diameter which are specially designed for use exclusively with power-driven machinery should be increased to 10 per cent *ad valorem* and converted into a protective duty.

The Government accepted the recommendations of the Tariff Commission. The period of protection to the industry, which was to expire by the end of 1954, was extended up to the end of 1955 and has since been extended up to the end of 1956.

Raw materials.—The most important raw material used in the manufacture of ball bearings and steel balls is high carbon chromium steel (HCI) bars and wire which are mostly imported. Brass strips and finished solid cages were also at first imported by the National Bearing Company from the United Kingdom. Later, steps were taken to manufacture these for certain sizes in the country. The National Bearing Company had installed an annealing furnace and a skinning machine for bars, and wire drawing equipment for wire, with the object of obtaining bars and wires to the required specification from the steel that was expected to be supplied by indigenous producers, and thus becoming independent of imports. There is, however, considerable difficulty experienced in obtaining quality billets from indigenous sources.

Brass rods, strips and tubes, mild steel for rivets and sleeves and nuts are available from indigenous sources.

In addition to the above-mentioned raw materials, high speed and high carbon tools, grinding wheels, certain chemicals and emery powder are required. Some of these items especially the ball grinding wheels have to be imported.

II. Programme of Development in the Second Plan

Estimated requirements.—The Tariff Commission in their inquiry into the Ball Bearing Industry had estimated the demand for ball bearings at 900,000 numbers a year in 1952. On the basis of the targets of production fixed under the Second Plan for various industries which consume ball bearings, it is expected that the demand for ball bearings for fitment as original equipment will be of the order of 2·1 millions in 1960-61 as given in the table below :—

Consuming industry	Annual requirements (Numbers)
1. Electric fans	1,200,000
2. Electric motors	180,000
3. Shaft cutter industry	50,000
4. Automobiles	400,000
5. Centrifugal pumps	100,000
6. Jockey pulleys for textile machinery	143,000
7. Tractor and earth moving equipment	20,000
TOTAL	2,093,000

It is not possible to make a correct estimate of the demand for ball bearings for replacement purposes, but it may roughly be placed at about 300,000. On the whole it seems reasonable to estimate the total demand at about 2·4 million bearings by 1960-61. As regards steel balls, it is expected that the demand by 1960-61 may go up to about 25 lakh gross in view of the expansion programme of the bicycle industry and other users.

Schemes under implementation.—The National Bearing Company have already undertaken an expansion programme involving an outlay of Rs. 45 lakhs. By the implementation of this expansion scheme, they expect to raise their present annual rated capacity of ball bearings from 600,000 to 900,000 numbers and of steel balls from 684,000 gross to 1,008,000 gross on single shift basis. They have estimated their additional requirements of raw materials at about 300 tons of alloy steel to be obtained from indigenous and foreign sources and about 20 tons of non-ferrous metals from the indigenous sources.

The New Haven Steel Ball Corporation are also reported to have undertaken an expansion scheme involving an additional investment of Rs. 1·5 lakhs, by which they expect to expand their capacity for steel balls from 500,000 to 1,000,000 gross on a single shift basis.

Targets of capacity and production.—As the requirements of ball bearings including replacements are estimated at about 2·4 millions by 1960-61, production on the same scale is envisaged by that period. The annual rated capacity of the industry on a single shift basis, as already mentioned, is expected to reach 900,000 bearings on the completion of the expansion programme which the National Bearing Company have undertaken. It is possible that this unit, with its expanded capacity and by working multiple shifts, may be in a position to meet nearly all the requirements of ball bearings by 1960-61. Any shortfall in the estimated production of ball bearings will be met by imports. It may be mentioned that there are about 3,000 different sizes and types of ball bearings manufactured in the world. It might be uneconomic to aim at the manufacture of those sizes for which the annual demand is small. Hence this country like others may have to depend upon imports for those sizes of bearings that are only required in small quantities.

Additional capacity :

Ball bearings.—While every encouragement should be given to the existing unit to carry successfully to completion its expansion programme, the need for creating additional capacity by the establishment of a new unit has to be kept in view, so that adequate capacity is installed to meet expanding demands after 1961. Certain types of ball bearings like those required for automobiles, tractors, earth moving equipment, passenger coaches and locomotives are at present either produced in insufficient quantities or are not produced at all. Similarly, there is scope for the production of taper roller bearings and bearings of sizes above 3". A new unit, when established should primarily concentrate on the manufacture of these items.

Steel balls.—The production of steel balls should reach a figure of 25 lakh gross by 1960-61 so as to meet the requirements by that period estimated at the same figure. The annual rated capacity of the steel balls industry on a single shift basis is expected to reach 20 lakh gross if the expansion schemes are successfully implemented. By working multiple shifts, the National Bearing Company alone were able to produce about 16·4 lakh gross steel balls in 1954. It can, therefore, be reasonably expected that the increased capacity will be adequate to meet the requirements of steel balls by 1960-61.

The following table summarises the development programme for the ball bearings and steel balls industry during the Second Plan period :—

Industry	Number of firms	Unit	Capacity on single shift basis		Estimated production	
			1955-56	1960-61	1955-56	1960-61
Ball bearings	1	('000 numbers)	600	900	889	2,400
Steel balls	2	('000 gross)	1,200	2,008	2,300	2,500

10. AGRICULTURAL IMPLEMENTS AND MACHINERY

The programme for the agricultural implements and machinery is discussed under the following heads :—

(A) Improved agricultural implements; and

(B) Power-driven agricultural machinery, comprising—

- (*i*) power-driven pumps (centrifugal);
- (*ii*) diesel engines; and
- (*iii*) agricultural tractors.

(A) IMPROVED AGRICULTURAL IMPLEMENTS

I. Review of Progress in the First Plan

Targets.—No targets were laid down for agricultural implements in the First Plan as statistical data regarding imports and production were not available and hence no accurate idea of future demand could be formed. It was, however, expected that the demand for improved implements would expand, the extent of such expansion depending upon factors such as the trend of agricultural price levels, the progress made by the extension services in popularising improved implements and the evolution of improved designs. It was recommended that the development of this section of the industry should mainly aim at developing a steady market for its products.

Capacity and production.—At present there are 62 factories engaged in the manufacture of improved agricultural implements and registered with the Development Wing of the Ministry of Commerce and Industry as against 68 reported in the "Programmes of Industrial Development, 1951-56". The annual capacity of these factories has been assessed at 26,880 tons in terms of steel.

The Tata (Agrico), Jamshedpur, is the largest unit having an annual capacity of 12,000 tons in terms of steel. The State-wise distribution of these factories is shown below :—

State	Number of factories	Annual rated capacity in tons of steel
Bihar	3	12,460
Bombay	11	4,428
Punjab	13	2,680
Uttar Pradesh	12	1,660
West Bengal	5	1,680
Delhi	4	804
PEPSU	1	744
Andhra	3	688
Madras	4	368
Madhya Pradesh	2	300
Mysore	2	720
Himachal Pradesh	1	300
Hyderabad	1	48
TOTAL	62	26,880

The above 62 units include two units in the public sector *viz*., the Nahan Foundry and the Mysore Implements Factory. They also include the unit of the Addison and Co. Madras, who were granted a licence for the manufacture of various kinds of sprayers and dusters and have already started production.

In addition there are about 350 small units engaged in the manufacture of agricultural implements which are registered with the State Governments apart from village blacksmiths who also produce some of these implements.

The types of improved agricultural implements which are being produced by the industry can be broadly classified into 7 categories as under :—

(*i*) Field implements, such as ploughs, cultivators, seeding, planting and threshing machinery.

(*ii*) Agricultural hand-tools, such as spades, shovels, hoes, pruning and cutting knives.

(*iii*) Irrigation equipment, such as persian wheels, manually operated water pumps, etc.

(*iv*) Machinery for processing agricultural products such as oil *ghanis*, cane crushers, chaff cutters, groundnut decorticators, tobacco barns, etc.

(*v*) Dairy and poultry farm equipment, such as churns, cream separators, honey extractors, etc.

(*vi*) Plant protection equipment, such as sprayers and dusters.

(*vii*) Farm transport equipment, such as wheel barrows, farm carts and hand push carts, etc.

Production of agricultural implements by the organised sector of the industry in terms of steel has been as follows during the last six years :—

Year	Production (Tons)
1950	17,158
1951	18,873
1952	18,195
1953	8,046
1954	12,728
1955	13,875

From the above figures it will be seen that a large portion of the capacity in existence is lying unutilised. The high level of production up to 1952 is considered to have been mainly due to the pent-up demand of the war years and the high level of food prices and increased acreage under cultivation which stimulate the demand for agricultural implements. The steep decline in production in 1953 was attributed apart from declining food prices, to the depression in the tea industry leading to a decline in the sale of hoes. The production of agricultural implements showed a recovery in 1954 and 1955.

Schemes licensed.—The K. T. Steel Industries, Bombay have been permitted to set up a new unit at Kutch for the manufacture of certain agricultural implements, since there is no organised capacity for such implements in that area. This firm proposes to manufacture a variety of implements, including cart axles, harrow and spade blades, digging forks, sickles, crow bars, etc. The Rampur Engineering Co., Rampur who used to manufacture agricultural implements have been allowed to revive the manufacture of cane crushers, chaff cutters and ploughs, etc. The Mysore Implements Factory has been allowed to organise itself on modern lines and also to expand its capacity substantially for the manufacture of agricultural implements. Another unit *viz.*, the Cossul and Co., Kanpur which was functioning as a small-scale unit has increased its labour force and has now come under the purview of the Industries (Development and Regulation) Act. The firm has also been allowed to increase its capacity.

Imports and exports.—Imports of agricultural implements during the last six years have been as follows :—

Imports in value (Rs. lakhs)

	Agricultural implements	Ploughs and parts	Others*	Total value
1950-51	24·6	1,11·6	68·4	2,04·6
1951-52	2·0	1,21·3	1,51·5	2,74·8
1952-53	1·5	37·3	58·2	97·0
1953-54	37·4	10·2	18·4	66·0
1954-55	54·8	13·3	17·1	85·2
1955-56 (Ten months, April to January)	42·1	7·0	17·6	66·7

*Includes corn crushing machines, threshing machines, chaff cutters, graders, disinfectors, etc.

Detailed statistics relating to the quantity of different types of agricultural implements and equipment are not at present shown separately in the Foreign Trade and Navigation Accounts of India. Steps are being taken by the Director General of Commercial Intelligence and Statistics, Calcutta to adopt the standard international trade classification.

Exports of agricultural implements are not recorded in the Foreign Trade and Navigation Accounts of India. However, there is no restriction on exports. Exports are on a limited scale and confined to South East Asian and Middle Eastern countries, East Africa and Caribbean Islands. There is felt to be considerable scope for developing export markets in these countries.

Estimated consumption and requirements.—In the absence of any definite statistical data regarding imports and production of agricultural implements, it is difficult to assess the actual offtake of agricultural implements.

Small-scale sector of the industry.—Improved agricultural implements are being produced by the organised small units concentrated in urban areas and also by the village blacksmiths, dispersed throughout the country.

Small-scale organised units.—There are nearly 350 organised small units manufacturing agricultural implements, located in urban areas like Batala, Phagwara, Jullundur, Kanpur, Howrah etc. These units employ on an average 15 persons and produce a good number of items.

They do a lot of fabricating work and have in many cases taken the lead in the production of new agricultural accessories and implements. In Phagwara and Jullundur small units are manufacturing 158,000 pairs of chaff cutter blades every year. In Batala small units manufacture peg-wheel gear attachments for animal or hand-driven agricultural machinery like rice hullers, winnowers, blowers, threshers etc. In Howrah, cane crushers, rice hullers, juice boiling pans and wheel-barrows are being produced by the small units and the quality of their products is acceptable commercially.

Dispersed village units.—Village blacksmiths dispersed throughout the country form a part of the agricultural implements industry. Every village blacksmith produces agricultural implements to meet the demand of the surrounding locality. About 62,000 persons are actively engaged in the blacksmithy trade in dispersed village units and about 5,250 in the small-scale organised sector.

Underemployment is the main problem for these workers. The blacksmiths are hardly employed full time for more than 2 months on the job. Other problems of the small producers are (*i*) lack of technical knowledge, (*ii*) non-availability of proper raw materials and (*iii*) lack of facilities for credit and marketing.

The Licensing Committee have reserved the manufacture of certain agricultural implements for the small-scale sector. A list of such items and those to be manufactured by the organised sector is given in the annexure to the paper.

Measures taken for the development of the industry.—A conference on agricultural implements and machinery was convened by the Ministry of Food and Agriculture in January 1953. The conference which was attended by the agricultural engineers of various States and the representatives of the firms manufacturing agricultural implements and machinery in the country, considered, *inter alia*, the steps to be taken for improving the implements industry and popularising the use of improved implements in the country. In pursuance of the recommendations of this conference, the State Governments have been asked to strengthen the existing agricultural engineering sections of their agricultural departments and also to set up advisory committees on agricultural implements. These advisory committees consisting of the representatives of State Agricultural Departments, manufacturing firms, farmers and other interests are to advise on the suitability of the different types of implements in consultation with Central Testing Stations under the Indian Agricultural Research Institute.

The improved agricultural implements industry is becoming increasingly important as a result of the Community Projects and the National Extension Service, since some improved implements are being introduced as an accompaniment of new methods of cultivation. Light weight iron ploughs and *tripholi* hoes seem to be two important items round which systematic extension activity centres in a few States. At the present stage, introduction of labour intensive but physically more serviceable implements is considered more appropriate since there is no scarcity of agricultural labour and the average unit of cultivation is too small.

Problems of the Industry.—The main problems with which the manufacturers of agricultural implements are confronted are acute shortage of grade I pig iron, coke and considerable delays in the supply of steel. The supply of graded pig iron will improve considerably towards the end of the Second Plan as a result of the expansion of the steel industry; but during the first few years, shortage is likely to continue. As regards coke, two merchant coke-oven plants are being renovated and consequently the supply is expected to increase by about one lakh tons. The supply position of steel is expected to improve in view of the substantial quantities to be imported from abroad. It was alleged by the industry that the price structure of the iron and steel industry was unfavourable and discouraging to all units except those located in the main port towns. The question of a uniform sale price throughout the country was reviewed and the Government decided in June 1956 to introduce a uniform price for all controlled categories of steel as well as pig iron at all rail head destinations in the country. This step will promote the growth of fabricating capacity in under-developed areas, apart from helping the units in the interior.

II. Programme of Development in the Second Plan

It is difficult to form an accurate estimate of the future requirements of improved agricultural implements in the absence of data relating to the volume of production and imports of different types of agricultural implements. It is, however, expected that as more area is brought under irrigation and cultivation and improved agricultural practices are adopted, the demand for agricultural implements will expand during the period of the Second Plan. The need for improved agricultural implements will also go up in view of the new methods of cultivation to be introduced through the Community Projects and the National Extension Service.

Since the development of the agricultural implements industry is linked with the development of blacksmithy, the Small-Scale Industries Board propose to adopt the following measures in order to help the blacksmiths :—

(*i*) Modern blacksmithy units are to be set up in the four regional Small Industries Service Institutes in order to train up instructors and demonstrators in modern blacksmithy operations.

(*ii*) The National Small Industries Corporation will help blacksmiths in marketing their products.

(*iii*) Modern equipment used in the manufacture of implements is proposed to be given to blacksmiths on instalment basis.

As a considerable portion of the capacity for the industry is lying idle in the country, efforts should be made to utilise the unused capacity. The industry should extend its range of manufacture to new items that are not at present being produced in the country. As already stated, the Licensing Committee is normally following a restrictive policy in regard to further expansion of this industry. Spheres of production for small-scale and large producers have been defined. One way to increase the demand would be to explore the possibilities of finding an enlarged export market. In this connection, supply of spare parts, standardisation and improvement of quality are necessary. The Indian Standards Institution should examine the question of laying down standard specifications on a comprehensive basis.

(B) POWER-DRIVEN AGRICULTURAL MACHINERY

(*i*) *Power-driven Pumps* (*Centrifugal*)

I. Review of Progress in the First Plan

Targets.—The First Plan envisaged an annual rated capacity for power-driven pumps (centrifugal) at 69,400 by 1955-56 as against 33,460 in 1950-51. In 1950-51 production was of the order of 34,000 and it was envisaged to increase to 80,000 pumps by 1955-56. The total requirements of pumps were placed at 100,000 by 1955-56 and the gap between requirements and domestic production was expected to be covered by the expansion of the deep-well turbine pumps industry.

Capacity and production.—In 1950 there were 8 organised units manufacturing power-driven pumps (centrifugal) with a capacity of 33,460 pumps per annum. At present there are 27 units on the active list of the Development Wing of the Ministry of Commerce and Industry with an installed capacity of 67,492 pumps per annum.

The increase in the number of units and capacity during the last six years is shown below :—

Year	Number of units	Annual installed capacity (Numbers)
1950	8	33,460
1951	9	34,600
1952	20	42,800
1953	24	60,200
1954	25	61,400
1955	26	65,092
1956*	27	67,492

*As on March 31, 1956.

Of the 27 units, the biggest are the Kirloskar Bros., Satara and the Dhandayuthapani Foundry, Coimbatore each with a capacity of 12,000 pumps per annum. In addition to these 27 units, the Nahan Foundry which is in the public sector has also, since 1953, started the manufacture of centrifugal pumps of different sizes and types. Certain parts of power-driven pumps are being manufactured in the ordnance factories also.

The present State-wise distribution of the 27 units is as follows :—

State	Number of units	Capacity (Numbers)
Bombay	10	35,160
Madras	9	26,772
West Bengal	4	2,720
Madhya Pradesh	1	100
Delhi	1	300
Uttar Pradesh	2	2,440
TOTAL	27	67,492

It will be seen that the industry is concentrated in the States of Bombay and Madras.

The capacity of the 27 units shown above includes the capacity for deep-well turbine pumps also, the position in regard to which is discussed below :—

The total demand for deep-well turbine pumps was estimated at 10,000 pumps during the First Plan period. In 1950-51 there was only one unit manufacturing deep-well turbine pumps *viz.* the Jyoti Ltd., with a capacity of 300 pumps per annum. During the period of the Plan the capacity of the industry increased to 1,970 pumps per annum, distributed between the different units as shown below :—

Name of the firm	Annual rated capacity (Numbers)
1. Jyoti Ltd., Baroda	800
2. Hindustan Industrial Corporation, Ghaziabad	100
3. Delta Engineering Co., Meerut	150
4. Ruston and Hornsby, Bombay	200
5. Macneill Berry, Calcutta	720
TOTAL	1,970

(The capacity of the Jyoti Ltd., which was 300 pumps in 1950-51 was reassessed and placed at 800 in 1955.)

The actual production of power-driven pumps (centrifugal) during the last six years has been as follows :—

Year	Production (Numbers)
1950-51	34,000
1951-52	46,000
1952-53	25,000
1953-54	28,000
1954-55	29,500
1955-56 (Ten months, April to January)	29,400
1955-56 (Estimated)	36,000

The steep fall in output in 1952-53 is attributed to the general slump as well as to imports of pump sets that were permitted under blanket licences for the Grow More Food Campaign.

Imports and exports.—The present import policy, *i.e.* January-June 1956, permits established importers to import centrifugal pumps with horizontal spindle having delivery outlet of 6" diameter and less up to the extent of 20 per cent (general and soft) of one half of best year's imports. With regard to the imports of pumps with horizontal spindle having delivery outlet above 6" diameter, the quota fixed for the established importers is 100 per cent (general and soft) of one-half of best year's imports subject to the condition that not more than 25 per cent of the face value of the licence can be utilised for the import of such pumps, Centrifugal pumps with vertical spindle are allowed to be imported to the extent of 75 per cent (general and soft) of one-half of the best year's imports. Since the beginning of 1953 imports of special pumps for fused caustic soda or acids and spare parts of all types of power-driven pumps except trailer pumps are being allowed freely under the open general licence.

The total imports of centrifugal pumps including turbine pumps during the last six years in terms of value have been as under :—

Year	Value (Rs. lakhs)
1950-51	57·2
1951-52	95·6
1952-53	80·6
1953-54	66·4
1954-55	59·3
1955-56 (Ten months, April to January)	51·6

There are no restrictions on exports of centrifugal pumps. However, the industry has not been able to develop export of centrifugal pumps to any appreciable extent. Export statistics are not separately recorded in the Foreign Trade and Navigation Accounts of India.

Consumption.—It is not possible to estimate precisely the number of pumps available to meet the internal requirements during the period of the Plan as at present imports are recorded in terms of value only and the actual number of centrifugal pumps imported is not given in the Foreign Trade and Navigation Accounts of India. However, a rough estimate can be had assuming the average price of an imported pump set to be about Rs. 1,500. On this basis the pumps available during each year of the Plan can be computed to have been as follows :—

Year	Production	Imports	Actual quantity available for consumption (Production plus imports)
	(Numbers)	(Numbers)	(Numbers)
1950-51	34,000	3,800	37,800
1951-52	46,000	6,400	52,400
1952-53	25,000	5,400	30,400
1953-54	28,000	4,400	32,400
1954-55	29,500	4,000	33,500
1955-56 (Ten months, April to January)	29,400	3,400	32,800
1955-56 (Estimated)	36,000	4,100	40,100

Quality.—The quality of the indigenous pumps is generally considered satisfactory. Standardisation and quality control are very important factors in the development of this industry. For this purpose the Indian Standards Institution are evolving standard specifications.

Raw materials.—The principal raw materials required for the manufacture of pumps can be classified broadly into two categories namely, (*i*) ferrous materials including pig iron for base plate and pump body and mild steel for shafts and keys and (*ii*) non-ferrous materials, mainly gun metal for impellers and bushings. All these raw materials are available from indigenous sources. Certain components like ball bearings, bolts with nuts, strainers, packing glands etc., are also required.

Capital and labour.—All the units manufacturing power-driven pumps (centrifugal) are also producing other machinery side by side so that it is not possible to give the investment in this particular industry separately. The total number of persons employed by the units manufacturing centrifugal pumps is estimated to be between 5,500 to 6,000.

Development Council.—A Development Council for power-driven pumps and diesel engines was set up in March 1953 under the Industries (Development and Regulation) Act. The Council has been assigned the function of recommending targets for production, co-ordinating production programme and reviewing progress from time to time and suggesting norms of efficiency and promoting arrangements for better marketing and standardisation of products. The Council has been concentrating attention on finding ways and means of improving the quality of pumps further, manufacture of components and collection of statistical information.

II. Programme of Development in the Second Plan

Estimated requirements.—At the commencement of the First Plan it was envisaged that the demand for power-driven pumps would be of the order of 85,000 by 1955-56, but the actual demand turned out to be considerably lower. Taking the number of pumps actually available for consumption for 1955-56, the present demand can be estimated at 40,000 per annum.

During the Second Plan period the additional area to be irrigated is expected to be about 21 million acres. Out of this about 9 million acres will be irrigated from minor irrigation schemes, which includes 1·2 million acres by tubewell schemes. With the progress of irrigation programmes to be undertaken during the period of the Plan the demand for power-driven pumps (centrifugal) will also go up, but it is not possible to give exact estimates of the probable rise. The requirements of pumps will also go up with the general development of various industries during the Second Plan period. It may be reasonable to put the demand at around 85,000 to 86,000 pumps per annum by 1960-61.

Schemes licensed:—The following schemes have been licensed or recommended for licence :—

	Name of the firm	Location	Additional or new capacity per annum (Numbers)	
1	Kirloskar Brothers (Expansion) . . .	South Satara (Bombay)	Pumps above 6" and up to 36".	240/300
2	Karam Chand Thapar & Bros. (New Unit)	Barakar, Burdwan (W. Bengal).	Centrifugal pumps 1,800 Multi-stage pumps 480 Ram type pumps 120	2,400

	Name of the firm	Location	Additional or new capacity per annum (Numbers)
3	Mody Brothers (New Unit)	Ulhasnagar (Bombay)	Baby self-priming pumps, contractor pumps, fire fighting trailer pumps and submersible pumps. 2,100
4	*British Electrical & Pumps (Expansion)	Calcutta	Centrifugal and centripetal pumps 2,400

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*The firm was already manufacturing centrifugal pumps as a small-scale unit and now wants to expand its production.

With the implementation of these schemes, the capacity of the industry will increase to 74,700 pumps per annum.

Capacity and production targets.—The existing capacity of the industry is of the order of 67,500 pumps per annum and with the implementation of the schemes already licensed, or recommended for licence, the total capacity for power-driven pumps will go up to about 74,700 per annum. Assuming demand to rise steadily to a level of about 86,000 pumps by 1960-61, it may be desirable to create additional capacity of 11,000 to 12,000 pumps per annum.

The country has been importing centrifugal pumps including turbine pumps of value varying from Rs. 50 lakhs to Rs. 95 lakhs per annum during the First Plan; it is desirable that self-sufficiency is achieved by the end of 1960-61. In sanctioning new units emphasis should be laid on the manufacture of special types of pumps which have not been manufactured in the country up till now.

Raw materials.—Assuming that one pump requires 2 cwts. of pig iron, 15 lbs. of steel for a horizontal pump (0·7 ton for vertical spindle pump) and 6 lbs. of gun metal, the total requirements for the production target of 86,000 (84,000 horizontal and 2,000 vertical spindle pumps) will be as follows :—

Pig iron	8,600 tons
Steel	2,000 tons
Gun metal	250 tons
Ball bearings	172,000 numbers

(ii) *Diesel Engines*

I. Review of Progress under the First Plan.

Targets.—At the commencement of the First Plan it was envisaged that the installed capacity for diesel engines of different H.P. would increase from 6,320 in 1950-51 to 39,725 by 1955-56. A production of 50,000 diesel engines per annum was envisaged by the end of the Plan period as against the production of 5,540 engines in 1950-51. It was estimated that the requirements of diesel engines up to 10 H.P. would increase to 40,000 and above 10 H.P. to 20,000 engines by 1955-56, thus bringing the total to 60,000. Subsequently, the Central Advisory Board of Industries in consultation with the Ministry of Food and Agriculture reassessed the future demand for diesel engines at 48,000 to 53,000 numbers consisting of 30,000 to 35,000 diesel engines up to 10 H. P., 10,000 from 11 to 20 H.P. and 8,000 engines of more than 20 H.P.

Capacity and production.—At the beginning of the Plan there were five units on the active list of the Development Wing of the Ministry of Commerce and Industry, engaged in the manufacture of diesel engines with a combined annual rated capacity of 6,320 engines on the basis of an 8 hour single shift and 300 working days. At the end of the Plan period the number of units increased to 16 with a capacity of 19,769 diesel engines per annum. In addition three more firms with a capacity of 10,000 engines per annum for the manufacture of Road Vehicular type of diesel engines were established to meet the automobile requirements. Out of 16 units mentioned, the bigger units are the Cooper Engineering Co., Satara and the Kirloskar Oil Engines, Poona.

The regional distribution of the diesel engines industry is as follows :—

State	Number of units	Annual installed capacity (Numbers)
Bombay	8	12,600
Madras	2	390
West Bengal	2	4,560
Delhi	1	200
Punjab	2	1,875
Saurashtra	1	144
TOTAL	16	19,769

The production of diesel engines of different horse powers during the last six years has been as follows :—

Year	Production (Numbers)
1950-51	5,540
1951-52	7,263
1952-53	2,909
1953-54	5,244
1954-55	9,273
1955-56 (Nine months April to December)	7,495
1955-56 (Estimated)	10,000

The production of diesel engines declined from 7,263 in 1951-52 to 2,909 in 1952-53 due to heavy imports. As a result, the manufacturing activities of most of the firms were curtailed and certain projected schemes were cancelled. There has been a significant increase in production in the last two years. The manufacture of multi-cylinder diesel engines up to 40 H.P. has also been started in the country. The types and sizes of engines produced now are :—

(*i*) Single cylinder horizontal water cooled slow speed engines in the range of 5 to 30 H.P. Engines above 30 H.P. of the same type can be manufactured against specific orders by a few indigenous firms.

(*ii*) Vertical single cylinder water cooled slow speed engines in sizes 6 to 10 horse power.

(*iii*) Vertical single cylinder high speed engines of 5 to 6 horse power.

(*iv*) Automotive diesel engines in sizes of 80 to 110 horse power.

A new series of high speed vertical diesel engines in single and multiple-cylinder versions and in power ranges of 10, 20, 30 and 40 H.P. for small industrial plants and marine applications (fishing vessels) are in an advanced stage of development.

High Horse Power Diesel Engines.—At present high power engines are not produced in the country. But with the development of industry the offtake of high power engines will be near about 40,000 H.P. per annum which can be taken as a basis for planning future development. There is need for both slow speed engines and high speed ones, as one type will not meet all the requirements. A licence has already been granted to the Ruston and Hornsby (India) Ltd., Bombay for the production of high power diesel engines.

Imports and exports.—The total imports of all types of oil engines and parts during the last six years is shown below :—

Year	*Imports of oil engines*		*Parts of oil engines*
	Quantity (Numbers)	Value (Rs. lakhs)	Value (Rs. lakhs
1950-51	36,003	6,93	1,82
1951-52	72,433	14,79	2,74
1952-53	17,715	4,51	1,97
1953-54	1,183	78	2,01
1954-55	1,470	1,15	2,00
1955-56 (Ten months April to January)	2,274	1,82	1,70

The industry has not yet taken up exports on a large scale. However, some firms have made efforts and have succeeded to a limited extent. It appears that there is a potential demand for Indian manufactured diesel engines in the Middle East and the Far East countries as enquiries from these countries have been received by some of the indigenous firms.

Estimated demand.—The total number of engines available to meet internal requirements (production plus imports of all types of oil engines) has been as follows during the last six years.

Year	Production	Imports of all types of oil engines	Actual quantity available for consumption
	(Numbers)	(Numbers)	(Numbers)
1950-51	5,540	36,003	41,543
1951-52	7,263	72,433	79,696
1952-53	2,909	17,715	20,624
1953-54	5,244	1,183	6,427
1954-55	9,273	1,470	10,743
1955-56 (Estimated)	10,000	2,750	12,750

In the year 1951-52, stocks piled up with the indigenous manufacturers as a result of heavy imports. Subsequently imports were restricted for engines within the range of indigenous manufacture. As a result, indigenous production increased considerably.

It will be seen that the average annual consumption during the last six years has been of the order of 28,000. It was about 12,750 in 1955-56 which is enormously lower than the original estimates of 48,000 to 60,000.

Diversification of production and manufacture of components.—The indigenous industry has so far concentrated on the production of engines suitable for agricultural purposes but during the period of the Plan some units have extended the range of production to new types also. The Kirloskar Oil Engines are now making single cylinder vertical 4 cycle high speed engines of 5 H.P. on 1,500 RPM and also trying to develop multi-cylinder engines of 18-20 H.P. The Cooper Engineering Co. have introduced a vertical model of 10-12 H.P. range in medium speed. The Textools have developed 2 stroke engines. The Simpson & Co. have started the production of Perkins-6 engines.

Since the industry is dependent on a number of imported components such as crankshafts, fuel injection equipment, cam shafts, connecting rods, cylinder lines, pistons, etc., it was recommended in the Plan that efforts should be made to start the manufacture of such components within the country. During the Plan period indigenous capacity has been established as under : The Kirloskar Oil Engines have developed the manufacture of "thin" bearings which are used in automotive type and other high speed engines. The Indian Pistons have established the manufacture of pistons, piston rings and pins up to a size of 6" diameter. The Motor Industries, Bangalore, in collaboration with Messrs. Bosch of Germany have commenced production of sparking plugs and fuel injection equipment. The Fuel Injection have been granted a licence to produce fuel injection equipment in collaboration with the Injector Company of Sweden. The manufacture of mechanical lubricators has been taken up by the Acme Manufacturing Co., Bombay.

Quality of engines :—The quality of diesel engines has improved greatly during the last few years. The Development Council for power-driven pumps and internal combustion engines has laid emphasis on the improvement of quality and increasing use of indigenous components and the firms have been responding. To encourage the indigenous manufacturers the Government of India have circulated a list containing full particulars of approved diesel engines with the instructions that the State Governments should give preference to the indigenous product whenever they make purchases for their agricultural and industrial programmes.

II. Programme of Development in the Second Plan.

Estimated requirements.—It is difficult to estimate with much accuracy the future demand for diesel engines. As a prime mover for agricultural pump, diesel engine may be expected to encounter increasing competition from the electric motor. The demand for diesel engines will become confined mainly to those areas where electric power will not be available. On the whole, it may reasonably be estimated that the demand for diesel engines by 1960-61 will be of the order of 20,000 to 21,000 per annum ranging from 1 to 50 H.P. As on the average, the demand is mostly of 10 H.P. diesel engines and therefore the demand in terms of H.P. can be taken at 200,000 to 210,000 H.P.

Schemes sanctioned by the Government.—The Jaymes Beechey and Co., Bombay have been granted a licence for the manufacture of 2,400 diesel engines ranging from 3 to 30 H.P. in technical collaboration with the Beechey Mary & Co., and the Russel Newberry Co. of the U.K.

The programme of manufacture is extended over a period of four years by the end of which the product will be 100 per cent indigenous. This firm was already manufacturing diesel engines but had stopped production for some time past.

Another licence has been granted to the Ruston and Hornsby (India), Bombay, for the manufacture of high horse power diesel engines ranging from 100 to 1,000 H.P. with a capacity of 200 engines per annum. The firm is at present manufacturing diesel engines of 10 to 12 H.P. in collaboration with the U.K. firm of the same name. The U.K. firm is also associated with Davey Paxman with whom the Indian firm now proposes to collaborate for the manufacture of high horse power engines, which will be sold under the trade name of "Ruston Paxman". The total investment for the production of 200 engines will be of the order of Rs. 92·4 lakhs including working capital.

Capacity and production targets.—On the basis of estimated demand by 1960-61 and with self-sufficiency as the objective to be achieved, the capacity and production targets are envisaged at 220,000 H.P. and 205,000 H.P. respectively.

Under the future development of the industry stress will have to be laid on the production of diesel engines above 50 H.P. required for rural electrification, marine propulsion, rail traction, drilling equipment, industrial power units, earth moving machinery etc. The production of medium speed heavy diesel engines by the Hindustan Shipyard for meeting the demands of the ship-building industry under the Second Plan has been accepted in principle by the Government.

Raw materials.—The quantities of principal raw materials required for the production of 20,500 diesel engines are estimated be to approximately as follows :—

Pig iron	13,000 tons.
Steel	1,400 tons.
Bronzes	500 tons.

(*iii*) *Agricultural Tractors*

I. Review of Progress under the First Plan.

Targets.—No targets of capacity and production were laid down for agricultural tractors under the First Plan. But it was envisaged that the demand for tractors would increase to between 12,000 and 15,000 per annum by 1955-56, as against the demand of 10,000 at the beginning of the Plan.

Capacity and production.—At present, there is no regular tractor manufacturing plant and the requirements are met by imports. A few firms have been assembling tractors in association with foreign collaborators from c.k.d. packs.

Imports.—Imports of agricultural tractors having a H.P. of less than 15 at the draw bar and those operated by petrol have been banned since 1951, while the imports of other approved makes were allowed freely. During 1952, blanket licences to all accredited agents of approved makes of tractors were issued freely except for the banned types. Since the middle of 1953 imports have been restricted to a quota of 100 per cent. (general and soft) of the best year's imports to those who maintain facilities for the servicing of tractors imported. The present import policy (January-June 1956) is the same. Tractors the import of which is banned at present are those having a H.P. of less than 10 at the draw bar and those operated by petrol. Spare parts for agricultural tractors are allowed to be imported to the extent of 100 per cent (soft and general). The actual imports of tractors and parts have been as follows during the last six years :—

	Agricultural tractors		Agricultural tractors and parts
	Quantity	Value	Value
	(Numbers)	(Rs. lakhs)	(Rs. lakhs)
1950-51	4,930	4,08·74	5,20·43
1951-52	7,148	5,89·13	7,82·75
1952-53	1,227	2,18·79	3,37·99
1953-54	3,195	2,54·23	3,70·55
1954-55	2,939	2,80·76	3,85·92
1955-56 (Six months April to September)	1,256	1,20·73	1,72·41

Consumption.—It was visualised that the demand for tractors would increase appreciably with an increase in the reclamation of weed-infested areas and the cultivation of new land, and would reach a figure between 12,000 to 15,000 per year by 1955-56 as against 10,000 at the beginning of the Plan. The import figures for the last six years show that the number of tractors added annually was about 3,600. It appears that the estimate of demand of 12,000 to 15,000 was on the high side. It is estimated that about 20,000 tractors are in use at present in the country as against 10,000 in 1949-50.

Action on main recommendations.—It was recommended in the First Plan that the development of tractor manufacture should be closely co-ordinated with the development of automobile manufacture in the country and should be considered only after a close examination of the scope for tractor cultivation in the country, the type of tractors required and the demand in respect of each type. This recommendation has been kept in view in licensing the Standard Motor Products of India for the manufacture of tractors. This firm is one of the approved manufacturers of automobiles and will be using the machine tools already installed and thus reduce the cost of components of tractors and automobiles as well.

In pursuance of the Planning Commission's recommendations regarding the need for service facilities for tractors and supply of spare parts, a Committee was set up by the Ministry of Food and Agriculture in February 1953 to suggest remedies for difficulties experienced by tractor users both in regard to spare parts and service facilities. The Committee in its report recommended that the question of starting a manufacturing plant for tractors and power implements and their spare parts in India should be examined by the Ministries concerned.

The Ministry of Commerce and Industry have formed a Committee of experts to go into the whole question of tractors and the tractor drawn implements industry. The Committee is to enquire and report on the technical requirements of agricultural tractors to suit Indian conditions of soil, climate and crops, requirements of tractors under different H.P. ranges; types of tractor drawn implements to be developed indigenously; the probable demand for tractor drawn implements of various types and the best geographical distribution of the manufacturing units.

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II. Programme of Development in the Second Plan.

Estimated requirements.—As stated earlier, the number of tractors added on an average in each year has been of the order of 3,600 during the period of the First Plan. An accurate estimate of the future demand for tractors cannot be made as it ultimately depends upon the future of mechanised agriculture in the country. Tractors are likely to be required for two purposes *viz.*, reclamation of land and for ordinary cultivation. During the First Plan more than one million acres of land have been reclaimed through the Central Tractor Organisation and 1·3 million acres through the State Tractor Organisations.

During the Second Plan, it is proposed to reclaim 1·5 million acres of land and to carry out improvements over an area of 2 million acres through the Central and State Tractor Organisations. It is unlikely, however, that any new tractors will be added to the Central Tractor Organisation nor are any great additions to the State Tractor Organisations at present in sight.

Some tractors are likely to be purchased by private individuals for general farming purposes, but here again proposals for imposing a ceiling on land holdings may discourage investment in tractors.

The Committee on Tractors and Tractor drawn Agricultural Implements has classified tractors into 3 broad groups for purposes of demand: (*a*) tractors of 12 to 18 H.P. at the draw bar (D.B. H.P.), (*b*) 20 to 30 D.B.H.P., and (*c*) 35 to 45 D.B.H.P. The Committee has estimated the demand for tractors of 12 to 18 D.B.H.P. at 1,500 per annum by 1960-61. The demand for tractors from 20 to 30 D.B.H.P. has been estimated at about 3,000 per annum by 1960-61. As regards tractors of 35 to 45 H.P. the demand will be meagre and has been put at 500. It may not be, therefore, economical to develop within the country the manufacture of tractors of this range, *viz.*, 35 to 45 D.B.H.P. Thus the total requirements for all types of tractors has been estimated by the Committee at 5,000 per annum by 1960-61.

Schemes licensed.—The Standard Motor Products of India, Madras, who are approved manufacturers of motor vehicles have recently been licensed to manufacture 4,800 tractors a year in association with the Standard Motor Co. of the U.K. The firm is at present engaged in the assembly of Ferguson tractors from units imported in a knocked down condition. It is proposed to manufacture progressively tractors of the model T.E. 35 which is powered by a diesel engine of 19–30 H.P. An additional investment of Rs. 67 lakhs is expected to be incurred on this project. The phased programme of manufacture will be spread over a period of 5 years at the end of which the indigenous content of the tractors will be about 60 per cent and finally 85 per cent, if further forging capacity becomes available in the country. The addition of the manufacture of tractors to the firm's existing automobile programme would help it engage the machine tools already installed to full capacity and thus keep down the cost of components for cars as well as tractors. The power unit of Ferguson tractor can also be used on Standard Van Car which is being developed by the same firm.

Targets of capacity and production.—A unit has already been licensed for the manufacture of tractors from 19 to 30 D.B.H.P. with a capacity of 4,800 per annum. The demand for this range of tractors has been estimated at 3,000 per annum by 1960-61 by the Committee. It is considered that there is no need at present to create any further capacity for tractors in this range. Further expansion of the industry may be necessary for the manufacture of tractors from 12 to 18 D.B.H.P.

In order to meet the requirements of skilled personnel like drivers and mechanics for the use of tractors, a training centre has already been established at Bhopal and it is proposed to establish one more such centre. The Agricultural Plan provides for the establishment of a tractor testing station which will examine the suitability of all types of tractors under Indian conditions.

The following table summarises the development of power-driven agricultural machinery, *viz.*, power-driven pumps (centrifugal), diesel engines and tractors during the Second Plan.

		1955-56	1960-61
Power-driven pumps (Centrifugal)—			
Annual rated capacity	Numbers	67,492	86,000
Production	Do.	36,000*	86,000
Diesel engines—			
Annual rated capacity	H. P.	200,000	220,000
Production	Do.	100,000*	205,000
Agricultural tractors (20 to 30 D.B.H.P.)—			
Annual rated capacity	Numbers	..	4,800
Production	Do.	..	3,000

*Estimated.

ANNEXURE

List of agricultural implements reserved for small-scale units

1. Axes, felling
2. Axes, pick
3. Blades, chaff cutters
4. Cans, ordinary and watering
5. Channels, watering (sheet metal)
6. Cultivators
7. Chains for cattle (mild steel)
8. Dusting machines (hand-driven)
9. Draught fans
10. Earth scrapers
11. Grain ridders
12. Graders
13. Hoes
14. Harrows and parts thereof
15. Hedge shears
16. Kodalis
17. Persian wheels (peg drive type)
18. Persian wheels except cast iron parts (gear wheel type)
19. Persian wheel parts excluding cast iron parts and including buckets and link chains
20. Pruning knives
21. Pans, open boiling
22. Ploughs complete, including blades, ordinary and improved type
23. Peg gear driving attachments (hand or cattle driven)
24. Rakes
25. Ridgers (hand or cattle driven)
26. Rat traps
27. Spades
28. Seeders

29. Seed drillers
30. Seed dressers
31. Shovels
32. Scythes
33. Sickles
34. Threshers (hand, paddle or animal driven)
35. Winnowers
36. Weeders
37. Weeder extinguishers
38. Water buckets
39. Water lifting equipment, other than persian wheels (hand or cattle driven)
40. Wheel barrows
41. Wheel, mild steel for carts
42. All edged hand tools used in agriculture.

LIST OF AGRICULTURAL IMPLEMENTS AND MACHINERY TO BE MANUFACTURED BY LARGE-SCALE UNITS

N.B.—All the following implements and machinery are power operated.

(*a*) Machinery for seed-bed preparation—
- *i.* Mould-board ploughs (Tractor drawn)
- *ii.* Disc ploughs (Tractor drawn)
- *iii.* Disc tillers (Tractor drawn)
- *iv.* Disc harrows (Tractor drawn)
- *v.* One-way harrow or harrow plough (Tractor drawn)
- *vi.* Cultivator or grubber (Tractor drawn)
- *vii.* Clod crushers, rollers and pulverisers
- *viii.* Middle-breakers or listers
- *ix.* Sub-soilers
- *x.* Rotary ploughs
- *xi.* Stack-cutters, tractor drawn

(*b*) Seeding and Planting Machinery—
- *i.* Tractor drawn seed drills
- *ii.* Tractor drawn seed-*cum*-fertiliser drills
- *iii.* Fertiliser placement machines
- *iv.* Row crop seeders, as for cotton, groundnut, maize, etc.
- *v.* Grain drills for wheat, oats, barley or rice, tractor drawn
- *vi.* Grain and seed cleaners, graders and seed dressing machinery
- *vii.* Potato planters and sugarcane planters
- *viii.* Transplanting machines

(*c*) Inter-cultivation Machinery, ridgers, etc.—
- *i.* Tractor drawn ridging ploughs
- *ii.* Tractor drawn cultivators, including attachments for inter-cultivations, hoeing, etc.

(*d*) Harvesting and Threshing Machinery
- *i.* Tractor drawn mowing machines
- *ii.* Tractor drawn harvesting machines or reapers
- *iii.* Hay baling and straw baling machines or hay presses
- *iv.* Hay stackers
- *v.* Power-driven threshing machines (about 5 H.P.)

- *vi.* Power-driven corn-shellers
- *vii.* Combined harvester threshers
- *viii.* Binders (Tractor drawn)
- *ix.* Cotton-pickers, sugarcane harvesters
- *x.* Potato diggers, potato spinners
- *xi.* Root crop harvesters such as groundnut diggers
- *xii.* Groundnut threshers or pickers

(*e*) Dairy Machinery—
- *i.* Power operated milking machines
- *ii.* Automatic milk bottling equipment
- *iii.* Complete plants for pasteurisation
- *iv.* Manure spreaders, manure loaders
- *v.* Milk cooling plant
- *vi.* Ensilage cutters—power operated

(*f*) Irrigation Machinery—
- *i.* Centrifugal pumps for irrigation from surface wells including power unit
- *ii.* Turbine pumps for deep wells (Tube wells)
- *iii.* Well-boring rings and allied equipment
- *iv.* Strainers and pipes required for tube wells

(*g*) Terracing and Soil Conservation Machinery—
- *i.* Graders, dozers and angle-dozers
- *ii.* Terracers
- *iii.* Excavators and scoops
- *iv.* Drag lines and ditching machines
- *v.* Mole drainage machines, sub-soilers, etc.

(*h*) Agricultural Processing machinery—
- *i.* Rice mills, hullers, shellers, graders and polishers
- *ii.* Wheat grinders and wheat milling machinery
- *iii.* Groundnut decorticators and oil presses
- *iv* Cotton gins, cotton presses, etc.
- *v.* Power-driven oil *kohlus*
- *vi.* Power-driven sugarcane crushers

(*i*) Plant Protection Equipment—
- *i.* Power operated sprayers, dusters and machines for the application of insecticides
- *ii.* Dust mixers

(*j*) Machinery for Storage and Preservation—
Cold storage and plants for potatoes

11 BICYCLES

I. Review of Progress in the First Plan

Targets.—It was visualised that by the end of the First Plan, the rated capacity and the actual production of the bicycle industry would increase to 530,000 numbers as against a capacity of 120,000 and a production of 101,136 cycles in 1950-51. Consumption was expected to rise to a level of 500,000 cycles, as compared with 266,597 cycles at the beginning of the Plan period, and to be met entirely from indigenous production. These targets have in fact been exceeded as will be evident from the following paragraphs.

Capacity and production.—At the commencement of the First Plan,only two units viz.the Hind cycles, Bombay, and the Hindustan Bicycle Manufacturing and Industrial Corporation,Patna, with a combined capacity of 120,000 cycles, were engaged in the production of complete bicycles. Three other units with an annual rated capacity of one lakh cycles each on a single shift basis, viz., the Sen-Raleigh, Asansol, the T.I. Cycles of India, Madras, and the Atlas Cycle Industries, Sonepat, had plans in various stages of implementation for the manufacture of bicycles but had not yet reached the stage of actual production.

During the first two years of the Plan, these three units and also the India Cycles Manufacturing Co., Calcutta, which was until 1951 engaged in the manufacture of component parts and accessories only, commenced production of complete bicycles. Since November 1953, 12 new units with a sanctioned capacity of 305,000 cycles have been approved. Approval has also been given for the expansion of the capacity of the T.I. Cycles and the Hindustan Bicycle Manufacturing and Industrial Corporation. Four of the new units, viz. the Wearwell Cycle Co., the Pearl Cycle Industries, the Avon Cycles, and the Nundy & Co. commenced regular production during 1955. The remaining eight viz., the H. R. Bhalla and Sons, the Rampur Engineering Works, the Popular Cycle Manufacturing Co., the Roadmaster Industries of India, the Jewanlal and Co., the Gopal Metal Works, the Metal Goods Manufacturing Co. and the Bicycle Manufacturing Co-operative Society were in the stage of development or experimental production during 1955 and are expected to commence regular production in 1956.

The sanctioned capacity of the units that were in production in 1955-56 may be reckoned at about 760,000 cycles. With the implementation of all the schemes, the annual capacity on a single shift basis will be about 9 lakh bicycles and since all these units might ultimately work on a double shift and attain in the second shift an output of about 60 to 65 per cent of capacity, the potential capacity of the industry may well be about 15 lakh cycles.

The large-scale bicycle manufacturing firms are distributed in the various States as follows :—

State	Number of units	Annual rated capacity on single shift basis (Numbers)
Bombay	1	100,000
Bihar	1	60,000
Delhi	2	84,000
Madras	1	200,000
PEPSU	1	25,000
Punjab	5	201,000
Uttar Pradesh	4	70,000
West Bengal	3	155,000
TOTAL	18	895,000

Most of the units in Delhi, PEPSU, Punjab and Uttar Pradesh are of recent origin and a number of them have not commenced production. As it is not likely that any appreciable number of new units will come into existence during the Second Plan, the above distribution is expected to hold good over the next 5 years.

The number of cycles produced in 1950-51 and 1951-52 amounted to 1·01 lakhs and 1·20 lakhs respectively. Since 1951-52, the progress has been relatively more rapid. By 1953-54, the number of cycles manufactured by the six major producers had risen to 2·89 lakhs and in 1954-55, with the commencement of production by some new units, the production reached a level of 4 lakhs. The production in 1955-56 is estimated to be about 5·5 lakh cycles as against the target of 5·3 lakhs envisaged in the Plan (*vide* table below).

Progress of Bicycle Industry during the First Plan

Year	Complete bicycles				Bicycle components and accessories		
	Numbers produced in India ('000)	Numbers imported ('000)	Numbers exported ('000)	Estimated consumption Numbers ('000)	Value of indigenous production (Rs. lakhs)*	Value of imports (Rs. lakhs)	Total value (Approximate) (Rs. lakhs)
1950-51 . .	101	166	..	267	64·5	96·0	160·5
1951-52 . .	120	283	..	403	88·9	1,44·3	2,33·2
1952-53 . .	211	198	..	408	77·3	1,35·5	2,12·8
1953-54 . .	289	90	..	379	91·1	94·9	1,86·0
1954-55 . .	401	89	..	490	1,18·6	1,72·3	2,90·9
1955-56(Estimated)	550	130	..	680	1,36·5	1,75·0	3,11·5

*Relates to calendar years, 1950 to 1955 in respect of the units borne on the list of the Development Wing. The number of units vary from year to year as follows :

1950—13, 1951—15, 1952—21, 1953—23, 1954—24 and 1955—20.

Imports and exports.—During the first two years of the Plan, the production of the indigenous units was quite insufficient to match the demand and so a large number of complete bicycles were imported. But imports are being displaced by indigenous production, and in 1953-54 and 1954-55 dwindled to about 90,000 cycles valued at around Rs. 90 lakhs. In 1955-56, however, they have shown some increase compared with the two preceding years.

About 30,000 cycles were expected to be exported during the last year of the Plan, but in fact exports have been negligible throughout the Plan period.

Consumption.—Internal demand for bicycles has shown a steady rise. The Tariff Commission (1954) estimated the demand at about 4 lakhs in 1954, 4·25 lakhs in 1955 and 4·5 lakhs in 1956. These estimates, however, have proved to be on the low side. The internal demand obtained by adding the import and indigenous production figures (there being no exports), has shown a more or less steady increase from about 4·03 lakh cycles in 1951-52 to an estimated 6·8 lakh cycles in 1955-56.

Quality and price.—There has been a marked improvement in recent years in the quality of bicycles manufactured in India and the workmanship and finish is generally satisfactory, but they have not yet quite reached the standard of durability and finish of comparable brands imported from abroad. Moreover, though their wholesale price is generally lower than that of the imported cycles of the same brand after payment of customs duty, a comparison of the c.i.f. prices of imported cycles and the wholesale prices of cycles of the same category manufactured in India indicates that the cost of production of cycles is considerably higher in India than in England. The steps to be taken to reduce the price of Indian cycles are engaging the attention of the Development Council for the Bicycle Industry.

Investment.—At the commencement of the Plan the total investment of the 6 leading producers amounted to Rs. 1,57 lakhs comprising plant and machinery Rs. 52 lakhs, land and buildings, Rs. 37 lakhs and working capital Rs. 68 lakhs.

The total investment of 13 major units as at the end of the Plan period is estimated at about Rs. 5,79 lakhs comprising Rs. 2,12 lakhs of plant and machinery, and Rs. 1,27 lakhs of land and buildings, the balance being working capital. Thus the total additional investment during the First Plan is estimated to be about 4,20 lakhs. Of this, the investment on fixed assets amounted to Rs. 2,50 lakhs.

Employment.—The number of workers employed which was 2,548 in March 1951, is estimated to be about 6,000 in March 1956.

Progress in the manufacture of parts and accessories.—The manufacture of parts and accessories is spread over a number of large and small-scale units besides the major producers of complete bicycles. At the commmencement of the First Plan, there was only one major unit, viz., the India Cycle Manufacturing Co. engaged exclusively in the manufacture of parts. Two of the producers of complete bicycles, viz., the Hind Cycles and the Hindustan Bicycle Manufacturing Co. were producing all the parts except chains, free-wheels, spokes, nipples, saddles and certain other accessories . Today most of the large units which turn out complete bicycles also manufacture, or are expected to manufacture, a good number of parts. There are 22 large-scale units borne on the active list of the Development Wing producing parts mostly for replacement purposes. Besides these there are about 460 small-scale units which are also engaged in the manufacture of parts. Except for cycle valves, which are not produced at all at present, and intricate and complicated parts such as lugs, B.B. shell and fittings, fork head fittings, hubs, chains, free-wheels, spokes and rims, which are not produced in adequate numbers, all other parts are produced in sufficient quantities. A firm which has been recently licensed for the production of cycle valves, is expected to go into production in the near future. Some units which have been licensed for the manufacture of components at present in short supply, have already started production of these. With the commencement of full-scale production of all the organised and small-scale units during the Second Plan period, it is expected that the industry will become self-sufficient in regard to component parts.

Location of units manufacturing bicycle parts and accessories.—The 22 large-scale units manufacturing parts and accessories, borne on the list of the Development Wing, are distributed over six States as follows :—

Bombay	4
Delhi	3
Punjab	3
West Bengal	6
Uttar Pradesh	5
Madras	1

The distribution of the small-scale units is reviewed separately. They are at present concentrated mainly in the Punjab-Delhi area, Uttar Pradesh, Bombay and West Bengal.

Imports of bicycle parts.—The import of bicycle parts decreased from Rs. 1,44 lakhs in 1951-52 to Rs. 1,36 lakhs in 1952-53 and to Rs. 95 lakhs in 1953-54. Increased production of bicycles during 1954-55 necessitated larger imports of parts during that year; and imports in 1955-56 are estimated to be higher than in 1954-1955.

Demand for bicycle parts.—On the basis of the investigations conducted recently by the office of the Development Commissioner, Small-Scale Industries, into the small-scale bicycle industry in the Northern Region, certain estimates have been made regarding the demand for bicycle parts in India, with special reference to this region. According to these estimates, the annual value of components consumed in 1955 was about Rs. 3·5 crores. This figure includes both the large and small-scale sectors of the industry. The increase in the demand for bicycles in the coming years will lead to a corresponding increase in the demand for bicycle parts, and all things considered, the value of annual requirements of parts during the Second Plan period may be placed at about Rs. 5 crores.

No reliable statistics are available as regards the capital investment in the units producing bicycle components only.

Despite the notable increase in the indigenous production of bicycles, the industry is still dependent on imports for certain components which are not yet manufactured in sufficient quantities. This dependence is being gradually reduced. The existing manufacturers of bicycles import those parts which are not made by them or are not locally available of the required quality or in sufficient quantities.

Co-ordination between producers of bicycles and bicycle parts.—There is no proper co-ordination between the producers of bicycles and the manufacturers of parts and accessories, except in respect of a limited number of parts such as rims, tyres, tubes and other rubber parts. The manufacturers of bicycles have so far been producing parts in their own factories for use as original equipment while the products of the ancillary units are used at present mainly for replacement purposes. While the quality of parts manufactured by the better organised and well-equipped units is in some cases as good as that of the imported ones, the parts produced by the other units are inferior in quality and are used for replacement purposes because of their relatively low price.

Development Council for the Bicycle Industry.— The Government of India constituted a Development Council for the Bicycle Industry in December 1953. The Council has made various recommendations with a view to achieving maximum production, improving the quality of indigenous products, bringing down costs of products and rated prices, etc. As a result of the review of the price trend of cycles by the Development Council from time to time during the last two years, some of the indigenous maunufacturers have reduced the prices of their cycles by an appreciable amount. The Council has in view further steps by which the price of indigenous cycles would be decreased further. The suggestions and recommendations of the Development Council have also helped to increase the production of cycles during the last two years.

Tariff protection.—The protection which the industry had been enjoying since 1946 was extended up to the end of December 1956 on the Government's acceptance of the recommendations of the Tariff Commission in 1954. The rate of import duty which was 73½ per cent. *ad valorem* (standard) and 63 per cent. *ad valorem* (preferential) up to September 1954 has since been revised to 47 per cent. *ad valorem* or Rs. 60 per cycle, whichever is higher, on cycles of British manufacture, and in respect of cycles of non-British manufacture, to the rate actually charged at the time for such products of British manufacture *plus* 10 per cent. *ad valorem*.

Bicycle Industry in the Small-scale Sector.—The bicycle industry in the small-scale sector has made considerable progress during the period of the First Plan. Due to the high standard of quality maintained by the organised factories, the small-scale manufacturers also had to improve their production techniques and raise the quality of their products. The workmanship and finish of their products have certainly shown improvement with the result that they are able to compete with the organised units.

There were about 460 small-scale units employing approximately 5,500 workers in the whole country at the beginning of March 1955. While some of them are well organised and have modern equipment and trained technicians, many are small proprietary concerns. The products of these small concerns are often sub-standard but are locally absorbed on account of their cheapness. These units employ labour of varying strength and may be grouped into four categories as follows :—

I. employing less than 5 workers,
II. employing 5-10 workers,
III. employing 10-20 workers, and
IV. employing 20-50 workers.

The number of units and the workers employed in the four categories of small-scale manufacturers mentioned above in various States is as follows: –

Number of Units and Workers in each State shown by Categories as on 1-3-1955

	Category IV		Category III		Category II		Category I		Total	
Name of the State	Number of units	Number of workers	Number of units	Number of workers	Number of units	Number of workers	Number of units	Number of workers	Number of units	Number of workers
Punjab	29	1,125	48	788	85	688	133	622	295	3,223
PEPSU .	7	303	5	60	3	24	10	30	25	417
Delhi .	3	150	..	..	7	56	12	36	22	242
Uttar Pradesh	16	480	20	300	10	70	19	57	65	907
Madhya Bharat	1	25	3	32	1	8	1	3	6	68
Madhya Pradesh	1	30	..	..	6	42	..	..	7	72
Madras	..	..	2	30	1	8	7	20	10	58
Travancore-Cochin	1	50	..	..	..	..	..	..	1	50
Hyderabad	..	..	..	..	2	16	8	20	10	36
West Bengal	6	200	..	..	10	80	..	..	16	280
Bombay	3	90	5	75	..	..	..	..	8	165
TOTAL	67	2,453	83	1,285	125	992	190	788	465	5,518

It will be seen that in the Punjab alone there are about 295 small-scale units employing about 3,200 persons. The principal centre of the industry is Ludhiana, the other centres being Jullundur, Amritsar and Batala. Almost all bicycle parts except the complicated types are manufactured by these firms. In PEPSU, 25 units employing about 400 workers are engaged in the manufacture of such parts as handbars, chainstays, seatstays, carriers, stands and handles. In Delhi there are 22 units employing 242 workers, manufacturing a variety of parts including handles, spokes and washers. About 65 units with 900 workers are operating in Uttar Pradesh, the main items manufactured being mudguards, carriers, axles, forks, pedals, handles, chain covers, cranks, B.B. Cups, stands, bells, saddles etc. The units are concentrated mostly at Kanpur, Agra and Lucknow. In Bombay State the units are located mostly in Bombay City and Ahmedabad. There are a small number of units in other States manufacturing various parts.

Problems of the Small-scale Industry.—The small-scale units, generally speaking, suffer from lack of standardisation, technical know-how, correct equipment, and finance. The equipment of most of them is far from adequate; there are no gauges and tools for achieving precision and facilities for heat treatment do not exist. They also find considerable difficulty in getting raw materials of good quality and have therefore to use whatever materials are available locally. The Development Council has, therefore, recommended that some constructive steps should be taken to improve the production of the small-scale units. It has suggested that raw materials of correct quality should be made available to them and that they should, at the same time, have the advantage of bulk purchases. It has also recommended the setting up of a Finishing and Testing Centre at Ludhiana, where most of the small units are located. This Centre, which is now being set up will manufacture tools and jigs for distribution to the manufacturing units for ensuring standardised production. It will also be equipped with facilities for heat treatment of parts, finishing of parts, *e.g.* enamelling, electroplating, testing and marking of finished parts, etc. and will have the necessary technical personnel to give advice to the manufacturing units. The Council has also recommended the establishment of a co-operative society for the distribution and sale of parts passed by the production centre and has suggested that technicians from the large organised units, which can spare their services temporarily, should visit the small-scale units from time to time and impart necessary technical advice. For a healthy development of the small-scale sector, workshops similar to the one being set up at Ludhiana, require to be located in different parts of the country.

II. Programme of Development in the Second Plan

Estimated requirements.—The level of requirements for each year of the Second Plan as estimated by the Development Council is as follows :—

Year	Indigenous demand (Numbers)	For export (Numbers)	Total requirements (Numbers)
1956-57	700,000	25,000	725,000
1957-58	750,000	50,000	800,000
1958-59	850,000	50,000	900,000
1959-60	1000,000	100,000	1,100,000
1960-61	1100,000	150,000	1,250,000

It can reasonably be expected that in the coming years, the offtake of bicycles will go up appreciably as a result of an increase in standards of living. The construction of a network of new roads and the expansion of trade within the country will stimulate the demand for bicycles. Moreover, the prices of indigenous cycles are likely to come down when the leading producers begin production on a mass scale and when imported components are replaced by those of indigenous manufacture. The decline in prices will both stimulate the internal demand for bicycles and also enable a reasonable number to be exported to neighbouring countries on a competitive basis. In view of these factors, the internal demand is estimated to rise from 6.8 lakh cycles at the end of the First Plan to about 11 lakhs at the end of the Second Plan. An export of 1·5 lakh cycles is also envisaged. Thus the total requirements of cycles is expected to rise from 6·8 lakh cycles at the end of the First Plan to 12·5 lakh cycles at the end of the Second Plan.

Targets of capacity and production.--The programme of development of the bicycle industry in the Second Plan aims at achieving not only self-sufficiency in regard to the domestic requirements of bicycles but also a progressive increase in the export of cycles from 1956-57 onwards.

For meeting the domestic and export requirements envisaged by 1960-61, an output of 12·5 lakh cycles is necessary. This output is sought to be achieved through the organised sector as well as the decentralised sector of the industry. In view of the considerable employment potentialities of the small-scale sector, adequate encouragement has to be given for a healthy development of this sector of the industry, which should be enabled to produce about 2·5 lakh bicycles per annum by 1960-61. The balance of 10 lakh cycles is expected to be produced by the large-scale sector of the industry.

As discussed earlier, the annual capacity of the organised sector on a single shift basis will increase from the present level of 760,000 cycles to about 895,000 cycles with the completion of the schemes which are in progress. Since all these units might ultimately work on a double shift, the potential capacity of 18 organised units may well be about 15 lakh cycles per annum. This is more than adequate to achieve the production target of 10 lakh cycles envisaged for the organised sector of the industry.

Investment and employment.—An investment of about Rs. 1,07 lakhs comprising plant and machinery Rs. 38 lakhs, land and buildings Rs. 11 lakhs and working capital Rs. 58 lakhs, is estimated to be necessary for the completion of the major schemes which are in progress. As the potential capacity of the existing 18 units in full production is more than adequate to meet the anticipated demand, no major units are expected to come into existence during the period of the Second Plan and no further investment is envisaged for the present. Since the major portion of the plant and machinery has been installed during the period of the First Plan, no substantial amounts are likely to be incurred for purposes of replacement and renovation over and above the normal depreciation. It is estimated by the Development Council that the total investment on replacement and renovation during the Second Plan period is not likely to exceed Rs. 50 lakhs.

The Development Commissioner, Small Scale Industries, has estimated that during the next 6 years, an additional investment of Rs. 205 lakhs will be required in the small-scale sector of the bicycle industry. Of this Rs. 35 lakhs will be for land and buildings, Rs. 50 lakhs for plant and machinery and Rs. 120 lakhs for working capital.

The large-scale units are expected to offer employment to about 8,000 workers by 1960-61; the total number of workers in the industry may rise to the level of about 15,000 by that period.

Requirements of raw materials.—Most of the raw materials required by the industry are available locally and imports are confined to steel tubes, cold rolled steel strips, cold rolled bright hexagonal bars and free cutting bright drawn steel bars and some consumer stores such as nickel anodes, some of the electro-plating materials and polishing and mopping materials. The steel requirements of the large-scale sector of the industry during 1955-56 and 1960-61 as estimated by the Development Council are as follows :—

	1955-56	1960-61
1. Steel tubes (tons)	2,400	4,000
2. M.S. Steel section of various categories for manufacturing components (local and imported) (Tons).	6,100	16,000

Attempts are being made to manufacture locally some of the materials. The Premier Automobiles, Bombay, and the Godrej and the Boyce Manufacturing Co., Bombay which have adequate capacity and equipment for the manufacture of steel tubes have started production on a limited basis and are expected to meet most of the local requirements by the end of the Second Plan. However, special types of steel for the manufacture of components may have to be imported even at the end of the Plan.

Position envisaged at the end of the Second Plan.—It is envisaged that the existing large-scale and small-scale units will be in a position not only to make the country self-supporting in regard to bicycles, but also to export about one and a half lakh cycles to nearby foreign markets and that the country's present partial dependence on imports of complete cycles and component parts will disappear by the close of the Plan. This will mean a saving of foreign exchange of Rs. 3 to 4 crores per year. The prices of Indian cycles are likely to come down when the leading producers begin production on a mass scale and when imported components are replaced by those of indigenous manufacture.

The following table summarises the development programme for the bicycle industry during the period of the Second Plan :—

		1955-56	1960-61
Number of units (Manufacturing only)		13	18
Rated capacity (on single shift)	(Numbers)	760,000	895,000
Estimated production	,,	550,000	1,250,000*
Domestic consumption	,,	680,000	1,100,000
Export	,,	..	150,000

*Including small-scale units.

12. SEWING MACHINES

I. Review of Progress in the First Plan

Targets.—At the beginning of the First Plan period, the rated capacity of the organised sector of the sewing machines industry stood at 37,500 machines per annum. The demand for sewing machines for domestic consumption was expected to go up to 80,000 per annum by 1955-56, and allowing for exports to the extent of 11,500 machines, a production target of 91,500 machines was envisaged by 1955-56. The capacity of the industry was expected to reach the same level by the end of the Plan. The progress actually achieved during the Plan period is discussed in the following paragraphs.

Capacity and production.—There were two organised units engaged in the manufacture of complete domestic sewing machines with a total capacity of 37,500 machines per annum at the beginning of the First Plan. These units were the Jay Engineering Works, Calcutta (the trade name of their machines being "Usha") and K. C. Mullick and Sons, Calcutta (the trade name being "Mullick"). The annual rated capacity of the latter unit has remained unchanged at 1,500 machines on a single shift basis. On the other hand the capacity of the former unit has expanded from 36,000 to 40,000 machines. Another unit *viz.* the Mahabir Export and Import Co. has been added on to the list of registered manufacturers. This firm which was until recently classified as a small-scale producer has been granted a licence for the manufacture of 5,000 domestic sewing machines. This capacity has already come into existence. Thus the present capacity of the organised sector of the industry is estimated at 46,500 machines per annum.

Although the installed capacity of the Jay Engineering Works is 40,000 machines per annum on a single shift basis, their annual production has been much higher than this figure. This has been made possible by working on more than one shift. They produced 43,186 machines in 1951, 48,580 machines in 1952, 61,299 machines in 1953, 78,308 machines in 1954 and 100,432 machines in 1955. K. C. Mullick and Sons are also aiming at a production of 4,000 machines per year by working multiple shifts.

The industry now produces Hand, Treadle and Electric driven domestic sewing machines of the following models:—

(i) Domestic model

(ii) Tailor model

and (iii) Link motion model.

Production of industrial sewing machines was started for the first time in the country in May 1952, by the Jay Engineering Works. They produced 151 industrial sewing machines in 1952, 800 in 1953, 211 in 1954 and 35 in 1955. The sharp decline in production in the last two years is attributed to lack of demand.

The quality of domestic sewing machines produced by the principal units has greatly improved and compares favourably with that of imported machines. There is, however, considerable scope for improvement in the quality of industrial sewing machines.

Production of sewing machines in the last six years has been as follows as against a target of 91,500 by 1955-56 set in the First Plan:—

Year	Production (Numbers)
1950-51	32,965
1951-52	48,116
1952-53	52,206
1953-54	68,417
1954-55	80,776
1955-56 (Ten months, April—January)	89,946
1955-56 (Estimated)	110,000

(NOTE.—The production figures shown above indicate the total production of all types of sewing machines by the two organised units *viz.* the Jay Engineering Works, Calcutta and K. C. Mullick and Sons, Calcutta, but do not cover the production of the decentralised sector.)

It will thus be seen that the production of sewing machines has been increasing steadily during the last six years and has exceeded the target of 91,500 by 1955-56, set in the First Plan.

Imports and exports.—The imports of domestic type sewing machines are restricted. The present import policy (January—June, 1956) for domestic and industrial sewing machines for established importers is as follows:—

Domestic sewing machines	20 per cent from soft currency areas.
Industrial sewing machines	20 per cent general and 100 per cent from soft currency areas.

Parts of sewing machines, domestic or industrial are allowed to be imported by the established importers to the extent of 15 per cent of half of the best year's imports of complete sewing machines or 15 per cent on the basis of imports of parts from soft currency areas. Sewing machine needles are allowed to be imported liberally. Recently small-scale producers have been allowed to import some of the spare parts, not being manufactured by them, on the basis of actual users licences.

Imports of sewing machines during the last six years have been as follows:—

Year	Quantity (Numbers)	Value (Rs. lakhs)
1950-51	23,425	63.62
1951-52	28,973	69.95
1952-53	20,003	54.30
1953-54	13,920	41.21
1954-55	13,976	40.41
1955-56 (Ten months, April—January)	10,199	29.95

In spite of competition, India has established an export market for sewing machines in various countries in South East Asia, the Middle East and Africa as also in Turkey, Australia, New Zealand and South America. Exports of sewing machines to various countries during the last six years have been as under as against a target of 11,500 machines by 1955-56 set in the First Plan:—

Year	Quantity (Numbers)	Value (Rs. lakhs)
1950-51*	4,611	8.7
1951-52*	6,164	12.2
1952-53*	8,119	15.5
1953-54	11,023	18.8
1954-55	5,288	9.3
1955-56 (Ten months, April—January)	3,743	5.7

* Figures relate to calendar years and have been taken from the Tariff Commission's Report (1954) on the Continuance of Protection to the Sewing Machine Industry. Exports of sewing machines were not specified in the Foreign Trade and Navigation Accounts of India until April 1953.

It will be observed that exports of sewing machines had been rising progressively till 1953-54. The decline since 1954-55 is due to import restrictions imposed by some countries especially Burma and Thailand. Discriminatory shipping freights also effect the export trade adversely. The question of freight rates is at present under examination by the Ministry of Transport.

Consumption.—The Planning Commission had estimated the demand for sewing machines of the domestic type at 54,000 during 1951-52 and 80,000 by 1955-56 and the demand for industrial sewing machines at 36,000 machines during 1951-52 and 44,000 machines per annum by 1955-56. The Tariff Commission in its report on the Sewing Machine Industry (1954) estimated the demand for domestic sewing machines at 70,000, 80,000 and 90,000 and industrial sewing machines at 10,000, 12,000 and 15,000 during the years 1954, 1955 and 1956 respectively. It is not possible to verify the accuracy of these estimates except in a rough and ready manner, because figures of imports and exports are not available for domestic and industrial machines for all the years separately and because there are no reliable figures of the production of the small-scale units. The figures of the actual production by the organised sector and of imports and exports of both domestic and industrial sewing machines combined are given below:—

Year	Production (Numbers)	Imports (Numbers)	Exports (Numbers)	Actual availability from the organised sector (Production + imports − exports) (Numbers)
1950-51	32,965	23,425	4,611*	51,779
1951-52	48,116	28,973	6,164*	70,925
1952-53	52,206	20,003	8,119*	64,090
1953-54	68,417	13,920	11,023	71,314
1954-55	80,776	13,976	5,288	89,464
1955-56 (Ten months, April—January)	89,946	10,199	3,743	96,402
1955-56 (Estimated)	110,000	13,000	4,400	118,600

* Figures relate to calendar years.

If we take into account the production of domestic sewing machines by the small-scale sector which is variously estimated at about 25,000 and at about 60,000 machines per year, the present consumption of both types of sewing machines, domestic as well as industrial, may be somewhere between 130,000 and 160,000 per year.

Capital and labour.—A sum of about Rs. 67 lakhs is estimated to have been invested up till now by the two organised units manufacturing sewing machines at the commencement of the First Plan. The number of persons employed at present by these two units is estimated to be about 1,800.

Tariff protection.—Protection to the sewing machines industry was first granted in April 1947 when the existing revenue duties of 24 per cent *ad valorem* (preferential) and 36 per cent *ad valorem* (standard) were converted into protective duties at the same rates and protection granted up to March 31, 1949. Protection was subsequently extended from time to time until December 31, 1954. The Tariff Commission in their Report (1954) on the Sewing Machine Industry stated that as fair ex-works prices of indigenous sewing machines were lower than the landed costs, ex-duty, of imported machines, the industry was no longer in need of tariff protection. The protection granted to the industry has, therefore, been withdrawn since January 1, 1955.

Sewing machine industry in the small-scale sector.—Besides the units in the organised sector, there are many small units at Ludhiana, Jullundur, Amritsar, Delhi and Bombay which are producing sewing machines from locally made as well as imported parts and are selling these machines under their own trade names. In evidence given before the Tariff Commission, it was estimated that the total annual production of these units is about 25,000 sewing machines. On the other hand the Small-Scale Industries Board has estimated the production of complete sewing machines by the small-scale units at 60,000 per year. At present only sewing machines of the domestic type are being produced by the small units. The industry started with the assembly of sewing machines by using imported parts and then gradually undertook the manufacture of parts and components which had previously been imported. The total number of parts in a complete sewing machine is 106 (excluding wooden table and machine cover). Out of these, 94 parts are being made by the small units and only the following 12 parts are being imported:—

1. Oscillating rock shaft
2. Face plate
3. Arm side cover
4. Bobbin case
5. Needle bar
6. Pressure foot
7. Link with stud
8. Square rollers
9. Thread take-up lever
10. Shuttle
11. Shuttle carriers with spring
12. Bobbin.

So far, the industry has developed unaided and in an unnoticed way, and it has proved itself able to stand on its own legs without protection from the competition of the large units. The main problems facing the small producers are:—

- (i) Lack of technical knowledge.
- (ii) Lack of finance.
- (iii) Lack of facilities for heat treatment and testing the quality of their product.
- (iv) Lack of supply of raw materials of proper specifications.

II. Programme of Development in the Second Plan

Estimated demand.—The demand for sewing machines as for other consumer articles is influenced by various factors such as the price at which they are offered, the purchasing power of the people and the cost of living. With the downward trend in the prices of indigenous machines and the higher purchasing power likely to be generated during the period of the Second Plan, the demand for sewing machines can be expected to increase considerably. The existing demand for the domestic and the industrial types of machines together is estimated at 130,000 to 160,000 machines per year (as stated earlier), including 25,000—60,000 domestic sewing machines produced by the small-scale units. It is generally considered by those connected with the industry that the demand may double by 1960-61. On that basis the total offtake of sewing machines five years hence may well be of the order of 300,000 per year (including about 20,000 machines of the industrial type), of which about 30,000 may be required for export.

Schemes licensed and under implementation.—A licence has been granted to one new unit and three other units, which were already operating on a small-scale basis but have now stepped up their production and labour force and thus come under the purview of the Industries (Development and Regulation) Act have also been licensed. The combined annual capacity of these four additional units comes to 43,700 sewing machines, including 30,000 industrial type machines.

Particulars of these units are given below:—

New unit.—The Laxmi Narain and Co. who were originally granted a licence in December 1953 to set up a factory at Andheri (Bombay) have now been permitted to locate the factory at Faridabad for the manufacture of 5,000 domestic and 18,000 industrial sewing machines.

Units already in existence.—(i) The Mahabir Export and Import Co. have been granted a licence to manufacture 5,000 domestic sewing machines and 12,000 industrial sewing machines per annum. This factory is located at Shahdara. As stated earlier, capacity for domestic sewing machines has already come into existence. The programme for the manufacture of industrial sewing machines is still to be implemented.

(ii) The Lotus Industries, Calcutta have been permitted to manufacture 3,000 domestic sewing machines. Their factory is located at Lillooah, Howrah.

(iii) Seth Jagat Bandhoo, Amritsar have also been granted a licence under the Act for the manufacture of 700 domestic sewing machines per annum.

When all these schemes are fully implemented, the total capacity of the organised sector of the industry will increase to 85,200 machines per year on a single shift basis.

Besides, the Rampur Engineering Works have also been granted a licence to manufacture spare parts of sewing machines.

Targets of capacity and production.—In considering what should be the installed capacity of the organised sector of this industry account has to be taken of the possibility of providing a good deal of diffused employment by enabling the small-scale sector of this industry to expand. It is envisaged therefore that the production of the small-scale units should increase to about 80,000 machines per annum and that of the organised sector to about 220,000 machines. As already stated the annual rated capacity of the organised sector is expected to increase to 85,200 machines on a single shift basis when the schemes already licensed are implemented. The Jay Engineering Works have been working on more than one shift and with their existing capacity they are in a position to produce 120,000 machines per annum working on multiple shifts. The firm expect to increase their production to 180,000 machines by 1959 by increasing their capacity but this expansion programme is yet to be licensed. Even excluding this programme the capacity of 85,200 machines per year on a single shift basis can be considered sufficient to produce the 220,000 machines visualised in the organised sector by 1960-61. It is, therefore, not considered necessary to create additional capacity in the organised sector of the industry over and above the limited expansion of the Jay Engineering Works mentioned above. However, the position can be reviewed after 1956-57 and if any of the schemes already licensed falls through, the creation of some additional capacity could be approved.

Investment and employment.—A sum of Rs. 1·2 crores is expected to be invested when the schemes already licensed and the expansion scheme of the Jay Engineering Works to produce 180,000 sewing machines are fully implemented. These schemes are expected to give additional employment to about 1,500 persons.

Requirements of raw materials.—The requirements of the main raw materials for the production of 300,000 machines are estimated to be as follows:—

Material	Quantity (Tons)
1. Pig iron	10,000
2. Steel (other than free cutting type and M. S. strips)	735
3. Steel, free cutting and strips	1,740
4. Steel balls	34,370 (gross)
5. Needles	12,000 (gross)

The following table summarises the development of the sewing machines industry envisaged during the period of the Second Plan:—

		1955-56	1960-61
Annual rated capacity on a single shift basis	(Numbers)	46,500	85,200
Production	,,	110,000*	300,000†
Domestic consumption	,,	130,000 to 160,000	270,000
Exports	,,	4,400*	30,000

*Estimated.

†Includes 80,000 domestic sewing machines expected to be produced by the small-scale sector.

13. HURRICANE LANTERNS

I. Review of Progress in the First Plan

Targets.—At the beginning of the First Plan the annual rated capacity of the hurricane lanterns industry was estimated at 4.3 million lanterns. Taking into account the programmes for the expansion of the industry then under contemplation, it was visualised that the annual capacity would increase to 4.5 million numbers by 1955-56.

The domestic demand for hurricane lanterns was estimated to increase to 5 million numbers per year by the end of the First Plan and allowing one million for export it was considered that a production target of 6 million lanterns per year would be adequate to meet the total requirements by 1955-56.

Capacity and production.—In 1950-51, there were 11 units manufacturing hurricane lanterns with an annual rated capacity of 4.3 millions. In April 1952, a new unit *viz.* the Mass Products (India) Ltd., Lucknow came into production with a capacity of 150,000 lanterns per annum. Another unit *viz.*, the Nagpur Glass Works, Nagpur which was working as a small-scale unit has increased its labour force and stepped up its production and thus has come under the purview of the Industries (Development and Regulation), Act. It has at present an annual rated capacity of 172,800 lanterns. The Ogale Glass Works, Ogalewadi have also increased their capacity from 300,000 to 720,000 lanterns in 1955. Another unit, the Guest Roberts and Co., Delhi, have merged with J. N. Sharma and Sons.

With the implementation of the above schemes the annual rated capacity of the industry has increased to 5.0 million numbers. The scheme of the Hindustan Lanterns, Saharanpur included in the First Plan has, however, not been implemented.

There are, therefore, at present 12 units on the active list of the Development Wing of the Ministry of Commerce and Industry with an installed capacity of 5.0 million lanterns per annum on a single shift basis. The manufacturers claim a capacity of 6 million lanterns per annum. The Universal Lamp Manufacturing Co., Calcutta have been allowed to expand their capacity to 600,000 lanterns per annum. The capacity of the industry is expected to be of the order of 5.5 million lanterns per year when this scheme of expansion is completed. The present regional position of the industry is given below:—

State	Number of units	Annual rated capacity on a single shift basis ('000 numbers)
Bihar	1	100
Bombay	1	720
Delhi	1	300
Punjab	1	500
Madhya Pradesh	1	172.8
Uttar Pradesh	2	525
West Bengal	5	2,685
TOTAL	12	5,002.8

As against a target of production of 6 million lanterns (including one million for export) by 1955-56 laid down under the First Plan, the actual production in the last few years has been as under:—

Year	Production ('000 numbers)
1950-51	3,244
1951-52	[illegible]
1952-53	3,531
1953-54	4,547
1954-55	5,069
1955-56	5,385

It will be observed that production has been increasing steadily during the last six years, except for a slight fall in 1952-53. The gap between the actual production and the target set for 1955-56 was due to the low level of exports of hurricane lanterns.

Imports and exports.—Imports of hurricane lanterns were completely banned during the years 1953 and 1954. During 1955 a token quota of 2 per cent of the face value of the licence for metal lamps and parts was permitted for import of hurricane lanterns. The same policy has been continued for the period January—June, 1956. The grant of this token quota is likely to keep the indigenous manufacturers alert in regard to the production of quality goods at competitive prices.

Imports of hurricane lanterns during the last few years have been as under:—

Year	Quantity ('000 numbers)	Value (Rs. lakhs)
1950-51	609.1	11.23
1951-52	166.2	7.10
1952-53	53.5	2.20
1953-54	25.7	1.20
1954-55	Negligible	..
1955-56	"	..

N.B.—Imports of hurricane lanterns are not shown in the Foreign Trade and Navigation Accounts of India. The above figures have been taken from the Statistics relating to Protected Industries.

The industry has developed an export market in East Africa, Malaya, Ceylon, Burma, and the Persian gulf countries. As against a target of one million by 1955-56, exports during the last 6 years have been as follows:—

Year	('000 numbers)
1950	15.0
1951	14.1
1952	107.2
1953	450.0
1954	325.0
1955 (Six months, January—June)	72.2

Consumption.—The Planning Commission had estimated the demand for hurricane lanterns to be between 3 to 4 millions in 1952 and it was expected to increase to 5 millions by the end of the period of the First Plan, excluding exports of about 1 million hurricane lanterns. The Development Wing of the Ministry of Commerce and Industry has estimated the demand for 1954-55 and 1955-56 at 4.5 and 5 million lanterns respectively. The Tariff Commission in its report on the Hurricane Lanterns Industry (1954), estimated the present demand for hurricane lanterns at 3.5 to 4 millions per year and this was expected to rise to 5 millions during the next three years, assuming continuance of good crops and improvement in the supply position of kerosine.

The actual number available for consumption during the last six years based on actual production plus imports minus exports has been as follows:—

Year	Production ('000 numbers)	Imports ('000 numbers)	Exports ('000 numbers)	Quantity available for consumption ('000 numbers)
1950-51	3,244	609	15*	3,838
1951-52	3,968	166	14*	4,120
1952-53	3,531	54	107*	3,478
1953-54	4,547	26	450*	4,123
1954-55	5,069	Negligible	325*	4,744
1955-56	5,385	,,	200**	5,185

*Figures relate to calendar years.

**Estimated.

Quality.—The quality of the indigenous hurricane lanterns has improved. Some of the consumers, however, complain of certain defects in construction, finish and performance etc. The manufacturers state that some of these defects in construction are due to non-availability of the proper raw materials at reasonable prices and also to the absence of any standard specifications for hurricane lanterns. The Indian Standards Institution has nearly completed the work of formulating standard specifications for hurricane lanterns and the standards are expected to be ready by about the middle of 1956.

Capital and labour.—A sum of about Rs. 50 lakhs is estimated to have been invested by the beginning of 1955 by the 12 units manufacturing hurricane lanterns. The number of persons employed at present by these units is estimated to be about 2,750.

Tariff protection.—The claim of the hurricane lanterns industry to protection or assistance was first referred to the Tariff Board in February 1946 and protection was first granted in April 1947, up to March 31, 1949, when the then existing revenue duty of 30 per cent *ad valorem* was converted into a protective duty at the same rate. Subsequently, the period of protection was extended up to March 31, 1950. The second inquiry into the industry was held in 1949 and protection was extended up to December 31, 1952. In 1951 a surcharge of 5 per cent was levied under the Finance Act of 1951 on revenue considerations, and the protective duty was consequently increased to 31½ per cent *ad valorem.* Protection was extended up to December 31, 1954, but has been withdrawn since January 1, 1955 as a result of the Tariff Commission's inquiry held in 1953 and 1954.

II. Programme of Development in the Second Plan

Estimated requirements.—As stated earlier the present domestic demand for hurricane lanterns is estimated to be of the order of 4.5 to 5 million lanterns per year. In view of the rural electrification programme envisaged under the Second Plan, it is considered that the demand for hurricane lanterns may not increase beyond 5 millions per year by 1960-61. This estimate was generally endorsed at a meeting held in the Planning Commission with the representatives of the industry. If the target of one million for exports which has not been achieved by the end of First Plan is now fixed for 1960-61, the total requirements of hurricane lanterns would be about 6 millions per year by 1960-61.

Targets of capacity and production.—Since the total demand for hurricane lanterns is estimated to be of the order of 6 millions by 1960-61, production of the same order is envisaged by that period. The annual rated capacity of the industry is expected to be 5.5 million lanterns on a single shift basis when the scheme of expansion of the Universal Lamp Manufacturing Co., Calcutta is completed. It is considered that this capacity is adequate to meet the requirements of hurricane lanterns by 1960-61, and that it is not necessary to establish any more new units during the Second Plan period. It may, however, be desirable to permit the expansion of some of the existing units so as to achieve more economic working.

Requirements of raw materials.—The requirements of the main raw materials for the production of 6 million hurricane lanterns are estimated as follows:—

Material	Quantity (Tons)
Tin plate	4,700
Steel wire	510

The following table summarises the development of the hurricane lanterns industry envisaged during the period of the Second Plan.

		1955-56	1960-61
Annual rated capacity on a single shift basis	(Million numbers)	5.0	5.5
Production	,,	5.4	6.0
Domestic consumption	,,	5.0	5.0
Exports	,,	0.2*	1.0

*Estimated.

14. COATED ABRASIVES AND GRINDING WHEELS

A. COATED ABRASIVES

Coated abrasives are essential consumable stores which are extensively used in most industries and handicrafts for abrading, polishing and sharpening materials of various types. Engineering, automobile and leather industries, railways and furniture makers are the largest consumers of coated abrasives.

There are a number of different kinds of coated abrasives, such as sand, glass or flint paper and cloth; emery paper and cloth; garnet paper and cloth; aluminium oxide paper, cloth and combination; silicon carbide paper, water proof abrasive paper, etc. Of these the most important are sand paper and emery cloth, the other items forming a camparatively small proportion of the coated abrasives employed.

I. Brief Survey of the Industry

The first attempt to produce coated abrasives in India was made by the Straw Board Manufacturing Co. at Saharanpur in 1936. Krishnalal Thirani and Co., Calcutta started work on a factory in 1934 but it did not come into production till 1938. In 1939, the Ajax Products, Madras came into production and in 1941 the National Sand Paper Mills set up works at Rawalpindi, which since partition, have been transferred to Ghaziabad in Uttar Pradesh. It was really during the period of the Second World War, when the supply of coated abrasives from external sources became very difficult, that the industry made great strides and developed rapidly.

Location, rated capacity and production.—There are, at present, four units in India manufacturing coated abrasives. The annual rated capacity of these units on the basis of 8 hours a day and 300 working days in a year is estimated at 150,000 reams as under:—

Name of the unit	Annual installed capacity
	(Reams)
1. Carborundum Universal, Madras	30,000
2. Krishnalal Thirani and Co., Calcutta	42,000
3. National Sand Paper Mills, Ghaziabad	30,000
4. Straw Board Mfg. Co., Saharanpur	48,000

Besides the organised factories mentioned above, coated abrasives are also manufactured by small producers on a cottage industry basis. No information is, however, available regarding the capacity of these small units.

Actual production of abrasives during the last six years has been as under:—

Year	Production
	(Reams)
1950-51	32,700
1951-52	41,700
1952-53	55,800
1953-54	59,900
1954-55	72,700
1955-56 (Ten months, April to January)	67,700
1955-56 (Estimated)	80,000

Capital and labour.—According to the Tariff Commission's Report, 1955, the paid-up capital of the four firms manufacturing abrasives in India is of the order of about Rs. 68 lakhs. The number of persons employed in the industry is 300.

Raw materials.—The raw materials required for the manufacture of coated abrasives may be classified under the following heads:—

(a) Natural abrasive minerals, such as quartz, garnet, corundum and emery;

(b) Synthetic abrasive minerals, such as silicon carbide (carborundum) and aluminium oxide grains;

(c) Special backing materials, such as kraft paper, cloth and vulcanised fibre; and

(d) Bonding materials, such as hide glue, technical gelatine and synthetic resin.

Of these silicon carbide and aluminium oxide grains, kraft paper and vulcanised fibre are imported from the U.S. A., Sweden and the United Kingdom. As regards emery, although the bulk of the requirements are supplied by the Shevaroy Bauxite Products, Salem, a small volume of imports has been necessary to cover the deficit. All the remaining raw materials are available in India.

Imports.—Imports of coated abrasives are not recorded separately in the Foreign Trade & Navigation Accounts of India. Statistics of imports of abrasive paper and cloth, compiled by the Director General of Commercial Intelligence and Statistics, Calcutta, for the last six years are given below:—

Year	Abrasive Paper		Abrasive Cloth	
	Quantity (Cwt.)	Value (Rs. lakhs)	Quantity (Cwt.)	Value (Rs. lakhs)
1950-51	207	0.58	2,082	4.19
1951-52	291	1.47	1,872	7.03
1952-53	682	3.06	623	4.02
1953-54	670	2.98	276	1.28
1954-55	840	2.76	395	1.63
1955-56 (Estimated)	800	2.50	385	1.58

Imports of those types of abrasives which are manufactured indigenously are allowed only on a restricted basis. The import policy during 1955 restricted licences for sand paper and glass paper to actual users and for special purposes. No licences were given in this year for imports of emery cloth and emery paper. On the other hand imports of emery fillets and water proof abrasives paper and cloth which are not yet produced in sufficient quantity and of good quality in this country, were liberalised in 1955 and no quota limit was prescribed for these items.

Tariff protection.—Tariff protection was first granted to the industry in 1947, when the revenue duties of 36 per cent *ad valorem* (standard) and 24 per cent *ad valorem* (preferential) on abrasive paper and 30 per cent *ad valorem* on emery cloth etc., were changed into protective duties at the same rates. In September 1949 the protective duty on emery cloth was raised to 35 per cent *ad valorem* on account of the increase in the cost of production. The period of protection was extended from time to time till December 31, 1955. In 1955, the Tariff Commission reviewed the case of the industry for continuance of protection and came to the conclusion that during the period of protection, the industry had consolidated its position and established itself on a secure basis. The capacity of the industry has also increased considerably and is now more than adequate to meet the requirements. The Commission, therefore, recommended that protection to the industry need not be continued beyond December 31, 1955. The Government has accepted this recommendation and protection to the industry has been withdrawn since January 1, 1956.

Problems of the Industry.—Besides many technical difficulties, the Indian abrasives industry is facing the following major problems:—

(i) Preference is still shown by many consumers for foreign abrasives even though indigenous abrasives of comparable quality are available.

(ii) Difficulties are experienced in securing adequate supply of suitable backing cloth at reasonable prices.

II. Programme of Development in the Second Plan

Estimated requirements.—The Tariff Commission in 1955, assessed the domestic demand for abrasives of all types at 80,000 reams in 1954 and at 88,000 reams in 1955. With the expansion of engineering industries, the requirements of abrasives are expected to increase substantially during the Second Plan period. Assuming a progressive increase in demand at the rate of 10 per cent per annum, it is estimated that the requirements of coated abrasives would be 150,000 reams by 1960-61. This estimate was generally endorsed at a meeting of the representatives of the industry held in 1955 and in the report of the Tariff Commission in 1955.

Schemes under implementation.—The following development programmes are under implementation:—

(i) The Carborundum Universal, are installing balancing and drying equipment at their works. The annual capacity of the factory is expected to increase to 75,000 reams when this equipment has been installed.

(ii) The Hindustan Abrasives, Salem district, Madras have erected a modern plant for the manufacture of coated abrasives. With some additional balancing equipment yet to be installed, the plant is expected to have an annual rated capacity of 60,000 reams on a single shift basis.

Additional capacity.—With the implementation of the schemes described above, the annual rated capacity of the industry will increase to 255,000 reams. This capacity would be more than adequate to meet the anticipated demand of 150,000 reams by 1960-61. It does not, therefore, seem necessary to expand the capacity of the abrasives industry further during the period of the Second Plan.

The following table summarises the development of the coated abrasives industry envisaged during the period of the Second Plan.

	1955-56	1960-61
	(Reams)	(Reams)
Installed capacity	150,000	255,000
Production	80,000 (Estimated)	150,000

B. GRINDING WHEELS

I. Review of Progress in the First Plan

Targets.—At the commencement of the First Plan there was only one factory producing grinding wheels in this country namely the Grindwell Abrasives, Bombay, with an annual capacity of 360 tons. It was envisaged that the total capacity of the industry would be raised to 840 tons by 1955-56 through an increase in the capacity of the Grindwell Abrasives to 600 tons per annum and through the establishment of a new unit by Krishnalal Thirani and Co., Calcutta, with a capacity of 240 tons per annum.

The demand for grinding wheels was estimated to reach a figure of 750 tons by the end of the Plan period and a production of 750-800 tons by 1955-56 was envisaged to meet it.

Capacity and production.—During the Plan period, the capacity of the Grindwell Abrasives has been stepped up to 1,000 tons per annum but the new unit to be established by Krishnalal Thirani and Co. has not materialised. Two other new units have however been established and these have increased the capacity of the industry to 1,370 tons per annum as explained below:—

(i) The Carborundum Universal, Madras have put up a factory at Madras with an annual capacity of 250 tons. The range of grinding wheels manufactured by the company is fairly comprehensive but is limited to a maximum diameter of 22 inches.

(ii) The General Abrasives have set up a factory at Ulhasnagar, Kalyan with an annual capacity of 120 tons. This firm will manufacture grinding wheels of sizes up to 18 inches diameter, 6 inches thickness and 8 inches bore.

In addition, another unit in the Punjab which was out of production is being renovated and put into commission. This unit belonging to the Steel and General Mills has an estimated capacity of 150 tons per annum.

Thus the present capacity of the industry stands at 1,520 tons per annum and is considerably in excess of the 840 tons originally envisaged.

Production of grinding wheels was expected to reach the level of 750-800 tons by 1955-56. The actual production during the plan period has been as follows:—

Year	Production (Tons)
1950-51	231
1951-52	352
1952-53	390
1953-54	395
1954-55	525
1955-56 (Ten months, April to January)	570
1955-56 (Estimated)	800

It seems probable that the target of production laid down in the Plan *viz.* 750-800 tons will have been just about reached. Notable progress has been made in the variety of products turned out by the industry. Besides manufacturing grinding wheels in all sizes and shapes up to 30" diameter and 9" thickness, grinding segments, stones, stock sand files of all kinds, valve grinding paste and thread grinding wheels, the domestic industry has also been producing some special types of wheels such as those required for the production of razor blades, abrasive discs for railway workshops, mounted points (small grinding wheels of different shapes fixed on steel spindles) and valve seat grinding wheels with steel bushes.

Consumption.—It was visualised under the First Plan that the demand for grinding wheels would increase to 750 tons per annum by 1955-56. The actual consumption of grinding wheels in the last six years has been as follows:—

Year	Production	Imports	Consumption
	(Tons)	(Tons)	(Tons)
1950-51	231	209	440
1951-52	352	202	554
1952-53	390	93	483
1953-54	395	112	507
1954-55	525	158	683
1955-56 (Estimated)	800	60	860

Investment.—A sum of about Rs. 20 lakhs is estimated to have been invested in the grinding wheels industry during the period of the First Plan.

Tariff Protection.—The industry has enjoyed protection during the past seven years through import restrictions and also through protective duties which were 50 per cent exclusive of surcharge from May 1947 to December 1948, 80 per cent from December 1948 to May 1949, 100 per cent inclusive of surcharge from May 1949 to May 1952, and 50 per cent exclusive of surcharge from May 1952. The Tariff Commission reviewed the case for continuance of protection to the industry in 1955 and recommended substantial reduction of these protective duties. The main recommendations of the Tariff Commission which have been accepted by the Government are:—

(1) The following types and sizes of grinding wheels should be excluded from the scheme of protection:—

(i) Grinding wheels having (a) more than 24 inches diameter or (b) less than 1/32 inch or more than 9 inches of thickness.

(ii) Diamond impregnated wheels.

(2) The protective duty on grinding wheels and segments of all kinds other than those to be excluded from the scheme of protection should be reduced from 50 per cent *ad valorem* exclusive of surcharge to 25 per cent *ad valorem* including surcharge. The protective duty should remain in force till December 31, 1957.

(3) The varieties of grinding wheels excluded from the scheme of protection should be subject to revenue duty of 25 per cent *ad valorem* including surcharge.

(4) The concession of duty-free imports of synthetic abrasive grains should be continued during the period of protection.

II. Programme of Development in the Second Plan

Estimated requirements.—On the basis of imports and domestic production the average annual consumption of grinding wheels is estimated to have been of the order of 650 tons during the First Plan period. Imports during this period were, however, restricted by import control and deliveries by the Grindwell Abrasives were often subject to delays, so that the real demand is considered to be considerably higher. The Tariff Commission estimated it at 750-800 tons in 1955.

There has been a marked increase in the demand for grinding wheels of late. With the increase in industrial activity expected during the Second Plan period, it is estimated that the demand for grinding wheels will increase progressively from year to year to 1,500 tons by 1960-61.

Schemes projected and under implementation.—The following proposals for the expansion of the industry are at present under consideration:—

(i) The Carborundum Universal who have recently gone into production have a scheme to expand their capacity from 250 to 600 tons per annum by the end of 1956.

(ii) Krishnalal Thirani and Co., Calcutta whose scheme for putting up a factory did not materialise in the First Plan are now expected to be taking it up during the Second Plan period. The annual capacity of this factory will be 240 tons.

Additional capacity.—With the implementation of the schemes mentioned above, the annual rated capacity of the industry will increase to 2,110 tons. It is considered that this capacity is adequate to meet the requirements of grinding wheels by 1960-61. It does not, therefore, at present seem necessary to create further capacity through new units during the Second Plan period.

Requirements of raw materials.—The main raw materials required for the production of 1,500 tons of grinding wheels are estimated to be as follows—

Synthetic abrasives	2,200 tons
Bonding material (imported)	25 ,,
,, ,, (indigenous)	200—300 ,,

Synthetic abrasives are not at present produced in the country and, therefore, have to be imported. Among bonding materials, elastic bonding is imported; but vitrified and mineral bonding materials are indigenously produced. The rest of the bonding materials such as clay, etc. are also available from indigenous sources. Among other raw materials, fibreglass discs have also to be imported. The value of these imported materials is a little over 80 per cent of the total cost of raw materials, the value of abrasive grains alone being about 73 per cent. The manufacture of synthetic grains requires a substantial supply of electric power at cheap rates. Although there are at present no definite plans for the manufacture of synthetic grains in the country, certain firms are reported to be considering the possibility of establishing a plant if conditions are found to be favourable. It is necessary to encourage efforts in this direction during the period of the Second Plan.

The following table summarises the development of the grinding wheel industry envisaged during the period of the Second Plan.

	1955-56	1960-61
Annual rated capacity (Tons)	1,520	2,110
Production (Tons)	800 (Estimated)	1,500

C. Electrical Engineering Industries

15. ELECTRIC TRANSFORMERS

I. Review of Progress in the First Plan

Targets.—The annual rated capacity of the electric transformers industry at the beginning of the First Plan was estimated at 370,000 KVA. Taking into account the programmes for expansion of the industry then under contemplation, it was visualised that the annual capacity would increase to 485,000 KVA by 1955-56. Production of transformers by the same year was expected to reach a figure of 450,000 KVA.

Capacity and production.—The annual rated capacity of the industry aggregating to 370,000 KVA in 1950-51 was distributed among seven manufacturing units. The capacity of these units was, however, reassessed by the Development Wing of the Ministry of Commerce and Industry in 1952 and was placed at 304,000 KVA per annum. Since then, five new units have gone into production, increasing the annual capacity of the industry by an additional 247,000 KVA. Details of these are given below:—

Name of the unit	Range of manufacture	Annual capacity (KVA)	Year of commencement of production
General Electric Co. of India, Calcutta	Up to 2,500 KVA/ 11 KV	36,000	1953
Kirloskar Electrical Co., Mysore	Up to 5,000 KVA/33 KV	75,000	1954
Bharat Bijlee, Bombay	Up to 3,000 KVA/33 KV	36,000	1955
Hindustan Electric Co., Howrah	Up to 10,000 KVA/33 KV	90,000	1955
Industrial Engineering Corporation, Pallom (Travancore-Cochin)	Up to 250 KVA/11 KV	10,000	1955

In addition to the above, the India Electric Works, Calcutta (an existing firm) with an annual capacity of 48,000 KVA have recently been added to the list of approved manufacturers of transformers and the capacity of the National Electrical Industries reassessed at 108,000 KVA per annum instead of 50,000 KVA as originally estimated. This has increased the estimated capacity of the industry by 106,000 KVA per annum.

Thus the capacity of the industry at the end of the First Plan came to 657,000 KVA per annum.

The State-wise distribution of the transformers industry as on April 1, 1956 is as follows:—

State	Number of units	Annual rated capacity ('000 KVA)
Bombay	4	264
West Bengal	5	243
Mysore	2	125
Madras	1	15
Travancore-Cochin	1	10
TOTAL	13	657

The two schemes which have not materialised according to schedule are the expansion schemes of the Radio Electricals, Madras and of the Government Electric Factory, Bangalore. These are, however, under implementation and are now expected to be completed during the Second Plan period.

The production of transformers for the last six years has been as follows:—

Year	Production ('000 KVA)
1950-51	179
1951-52	202
1952-53	231
1953-54	327
1954-55	434
1955-56	629

The production of transformers has shown a progressive increase over the 1950-51 level and it has considerably exceeded the target of 450,000 KVA per annum laid down in the Plan. This increase in production, which has been secured by multiple-shift operation by some plants, is in line with the growth of power development in the country. The beneficial effects of regulated imports have also contributed to the steady rise in indigenous production.

Noteworthy progress has also been made in the range of transformers produced in the country. Only low rating transformers up to 1,000 KVA and 22 KV were manufactured before the First Plan. During the Plan period, however, transformers up to 5,000 KVA/33 KV on the high tension side were produced and with the coming into production of the Hindustan Electric Co., the range of production is expected to increase to 10,000 KVA/33 KV shortly.

The manufacture of current and potential transformers required for the operation of instruments, meters and relays in metering and protective systems has not yet been taken up in the country.

The value of the domestic output of transformers in 1955-56 has been placed at Rs. 3·0 crores.

Imports and exports.—The number and type of transformers imported into the country are not recorded in the Foreign Trade and Navigation Accounts of India. Imports of transformers in terms of value have been as follows:—

Year	Value (Rs. lakhs)
1950-51	1,54·0
1951-52	1,44·5
1952-53	1,49·4
1953-54	1,97·5
1954-55	1,61.6
1955-56 (Ten months April to January)	1,43·1

Imports of low rating transformers are restricted. Thus imports of transformers up to 1,500 KVA and 22 KV on the high tension side are at present allowed to established importers only up to 25 per cent of the best year's imports. Imports of high rated transformers not manufactured in the country are allowed freely.

There are at present no exports of transformers and there does not seem to be any possibility of developing an export market in the near future due to heavy local demand.

Demand.—The demand for transformers, as is evident from the rising levels of indigenous production, has shown an upward trend during the First Plan period corresponding with the increase in the power generating capacity in the country. The increase in demand for transformers has been particularly marked since 1953-54. The requirements of transformers of lower ratings are almost entirely met from indigenous production and imports are mostly confined to the higher rated transformers not produced in the country. It will, therefore, be safe to assume the demand for low rated transformers (33KV and below) to be nearly equal to the indigenous production. On this basis, the demand for these transformers in 1955-56 may be estimated at 600,000 KVA. This is exclusive of the demand for high rated transformers.

Heavy Electrical Equipment Project.—In view of the increasing dependence of the country on foreign suppliers for heavy equipment required in connection with the generation, transmission and utilisation of electricity, the Central Government decided to investigate the possibility of establishing a factory for the manufacture of heavy electrical equipment. Negotiations were carried out in 1955 with a number of leading international manufacturers and it has, been finally decided to proceed with the establishment of a factory to produce most of the heavy electrical equipment required in the country on the basis of a phased programme spread over a period of about eight years. This factory will undertake, *inter alia*, the manufacture of heavy transformers of 33KV and above corresponding to 450,000 KVA per annum as well as current and potential transformers in the required numbers. Details of this scheme are given in the programme for Industrial Machinery.

Development Council.—In February 1955, the Development Council for Heavy Electrical Industries was set up under the Industries (Development and Regulation) Act. The electric transformer industry comes within the purview of this Development Council which has formulated recommendations regarding the development programme of this industry in the Second Plan.

Tariff protection.—Protection was first granted to the transformers industry in 1952, when the Government accepted the Tariff Commission's recommendation that the import duty on power and distribution transformers up to 2,500 KVA and 33·5 KV on the high tension side (primary voltage being 250) excluding furnace rectifier and flame-proof transformers, should be increased from the then level of 5 per cent *ad valorem* to 10 per cent *ad valorem*, exclusive of surcharge, and converted into a protective duty. This protective duty was to remain in force till December 31, 1955. The question of continuance of protection to the industry is at present under the consideration of the Tariff Commission. Pending the report of the Tariff Commission, protection has been extended to the industry for another year *i.e.*, till December 31, 1956.

II. Programme of Development in the Second Plan

Estimated requirements.—The demand for an item like transformers cannot be estimated with any great degree of accuracy. It is essentially linked up with other factors such as generation and transmission of power and the utilisation of transformers at the various load centres. The Development Council for Heavy Electrical Industries, first estimated the demand for transformers of 33 KV and below at about 900,000 KVA per annum by 1960-61. The question of future demand was further examined by the Council in early 1956 and the view was taken that having regard to the fact that an additional capacity of 3·4 million KW would be commissioned between

1956-61, and assuming a ratio 1 : 1·7 between the generating capacity and distribution transformer capacity, the requirements would come to 5·78 million KVA over the five-year period. The average annual demand would come to 1·156 million KVA. The ratio of 1 : 1·7 was regarded as low and it was ultimately decided to adopt the ratio 1 : 2 on the basis of which the average annual requirements were placed at 1·36 million KVA. The corresponding installed capacity for distribution transformers below 33 KV has been placed at 1·5 million KVA per annum by 1960-61.

Schemes licensed and under implementation.—A number of schemes designed to increase the capacity of the industry has been licensed under the Industries (Development and Regulation) Act during the First Plan. Details of the schemes approved for imp'ementation and expected to materialise during the Second Plan are given below:—

Name of the firm	Nature of the scheme	Present annual capacity (KVA)	Annual capacity when the scheme is completed (KVA)
Gandhi Electric Industries, Bombay	Expansion	..	5,000
M. R. Kodandaraman, Madras	New Unit	..	30,000
Radio Electricals, Madras	Expansion	15,000	102,000
Govt. Electric Factory, Bangalore*	Expansion	50,000	92,000
Crompton & Parkinson Works, Bombay	Expansion	108,000	156,000
Hindustan Electric Co., Howrah	Expansion	90,000	135,000
Radio Lamp Works, Bombay	Expansion	30,000	60,000
Easun Engineering Co., Bombay	New Unit	..	66,000
Kirloskar Electric Co., Mysore	Expansion	75,000	175,000
General Electric Company of India, Calcutta	Expansion	36,000	136,000
Electric Construction Equipment Co., Calcutta	Expansion	24,000	124,000

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*This is a public sector scheme for which a provision of Rs. 1·2 crores has been made in the Second Plan. The ultimate capacity of the factory is proposed to be 200,000 KVA per annum.

With the implementation of the schemes mentioned above, the rated capacity of the industry is expected to increase from 657,000 to 1,310,000 KVA per annum.

Additional capacity required.—Having regard to the target capacity of 1·5 million KVA to be achieved by 1960-61, additional capacity of about 200,000 KVA per annum will have to be created during the Second Plan. The Ministry of Production has suggested that out of this, 150,000 KVA might be reserved for the Government Heavy Electrical Project, as it would bring down the overhead charges and help to make it a more economic unit. Assuming that this proposal is carried out and that, as provided under the Plan, the Government Electric Factory, Bangalore will take steps to achieve the target of 200,000 KVA, it does not seem necessary to license any further capacity under the Second Plan beyond sanctioning alternative schemes in the event of any of the projects approved so far being abandoned.

The production of high rated transformers as already mentioned will be taken up by the Heavy Electrical Equipment Factory.

Requirements of raw materials.—A rough estimate of requirements of raw materials for the production of 1·36 million KVA of transformers by 1960-61 is given below: —

Raw materials	Quantity	
1. Mild steel	4,300	tons
2. Electrical steel sheets	5,400	„
3. Copper wires and strips	2,400	„
4. Insulating materials	720	„
5. Transformer bushings	90,000	„
6. Transformer oil	1,440,000	gallons
7. Transformer cooling tubes	900,000	feet

Of these, electrical steel sheets, copper wires and strips, insulating materials and transformer cooling tubes are at present partly imported. It should, however, be possible during the Second Plan period to achieve self-sufficiency in regard to most of these items. The production of electrical steel sheets has to be planned in one of the steel plants which are being newly set up or being expanded. The manufacture of suitable quality of insulating varnishes and paints can also be taken up in the country. Micanite is, at present, manufactured in small quantities by a few firms and the requirements of the country in respect of this insulating material are partly met from these sources and partly by imports. Certain proposals for its expansion are also under consideration. It may be expected that during the Second Plan period, this industry will develop sufficiently to meet almost the entire requirements of the electrical engineering industries.

The following table summarises the development of the transformer industry envisaged during the Second Plan period.

	1955-56	1960-61
Annual capacity ('000 KVA)	657	1,500
Production („)	629	1,360

16. ELECTRIC MOTORS

I. Review of Progress in the First Plan

Targets.—The First Plan envisaged the annual rated capacity for the electric motors industry at 300,000 H. P. by 1955-56 as against 149,500 H. P. in 1950-51.

The demand for electric motors between 1 and 50 H. P. was of the order of 200,000 H. P. in 1950. It was visualised that the total requirements of A. C. 3-phase squirrel cage and slipring induction type of motors up to 50 H. P. would increase to about 320,000 H. P. per year by 1955-56. Accordingly a production target of the same order *viz.* 320,000 H. P. was set up for achievement by the end of the Plan period.

Capacity and production.—At the beginning of the First Plan there were 10 firms on the active list of the Development Wing of the Ministry of Commerce and Industry engaged in regular manufacture of electric motors. They had an installed capacity of 149,500 H. P. per annum. By June 1952 two new units went into production and the capacity of the 12 units stood at 200,000 H. P. per year and remained at the same level till the end of 1953. In 1954 the capacity of the 12 units was reassessed at 263,000 H. P. and remains the same at present. The State-wise distribution of the electric motors industry is shown below:—

State	Number of units	Annual rated capacity
		(H. P.)
West Bengal	5	75,500
Bombay	4	124,000
Madras	2	13,500
Mysore	1	50,000
TOTAL	12	263,000

The actual production of electric motors has been as under during the last six years:—

Year	Production ('000 H. P.)
1950-51	99·0
1951-52	153·0
1952-53	160·0
1953-54	161·0
1954-55	201·0
1955-56 (Ten months, April to January)	216·0
1955-56 (Estimated)	271·0

It will be seen that the production of electric motors in the first year of the Plan increased by about 54 per cent over that of 1950-51. For the next two years, *viz.* 1952-53 and 1953-54, the rate of increase was not significant but production was maintained at a higher level of about 160,000 H. P. In 1954-55 the production registered an increase of some 25 per cent over the preceding year; as compared to the base year it was more than double. The increase seems to have been maintained in 1955-56, the estimated production for the year being 271,000 H. P.—as compared to 99,000 H. P. in 1950-51.

Electric motors are of various types depending upon the uses to which they are put and the nature of the electricity available *i.e.*, direct or alternating current. Direct current motors are essentially of three types, short wound, series wound and compound wound. The most widely used alternating current motors are the induction type (squirrel cage or slipring), the synchronous type, the variable speed or commutator type and the single phase type of fractional and low horse power. Of these types A.C. 3—phase squirrel cage and slipring types of motors up to 75-100 H.P. are being regularly manufactured in the country on an organised scale. The demand is mainly for motors up to 30 H. P. Manufacture of large motors has been undertaken; the largest motor so far produced being of 300 H. P. Special types of motors such as dual speed motors, loom motors, spinning frame motors, vertical spindle and hollow shaft motors are also being produced by some of the manufacturers.

Imports and exports.—The present import policy (January—June, 1956) for electric motors is as follows:—

Imports of A. C. 3—phase, 50 cycles, squirrel cage motors up to 50 H.P. and slipring motors from 10 to 50 H. P. are banned. Imports of motors of one H. P. and below suitable for D.C. supply or single phase and other types of motors are allowed to the established importers at 100 per cent of one half of the best year's imports from soft currency areas.

Imports of electric motors (in value) have been as under during the last six years:—

Year	Imports
	(Rs. lakhs)
1950-51	1,41.0
1951-52	1,11.7
1952-53	1,22.9
1953-54	1,45.3
1954-55	1,38.8
1955-56 (Ten months, April—January)	1,28.7

The quantity and value of electric motors exported are not known.

Consumption.—The annual requirements of the country for electric motors were estimated by the Tariff Board in its report on the Electric Motors Industry, 1949 at 300,000 H. P. of which a little over 100,000 represented the demand up to 30 H. P. The Tariff Commission in its report of 1955 has estimated the present demand for A. C. motors at about 317,000 H. P. consisting of 187,000 for motors up to 30 H. P. and 130,000 for fractional motors and motors of 31 H. P. and above and special types of motors. The Planning Commission in its "Programmes of Industrial Development, 1951-56" estimated the total demand for A. C. 3—phase squirrel cage and slipring induction motors up to 50 H. P. at about 320,000 H. P. by 1955-56 on the assumption that the generation of electricity would increase at the same rate as in 1951 and that industrial activity would keep pace with it. Since figures are not available showing the exact number of electric motors of each range imported or produced, it is not possible to estimate precisely the demand for electric motors. It can, however, reasonably be said that the present demand for electric motors of the A. C. type is between 320,000 to 330,000 H. P. As already indicated the production of electric motors has been increasing since 1950 and the trend is now towards production of motors of higher H. P.

Quality.—There are conflicting views regarding the quality of indigenous electric motors. Some of the consumers and importers state that the quality is satisfactory, particularly of motors produced by the manufacturers who have tie-ups with foreign manufacturers. Some of the consumers, however, complain that the manufacturers do not conform to standard specifications and the motors cannot take the full load as indicated on the plates. It is further pointed out that winding is inferior; the insulation resistances are low; internal connections are wrong; the clearance between winding and covers is narrow and this makes it difficult to carry out any inspection or repairs. Some of the manufacturers admit that motors produced by them are not suitable for use in chemical factories or places where humidity is high. However, it is generally considered that the quality of indigenous motors has much improved, but special care is necessary in the manufacture of electric motors which are required for heavy duty or for work in special atmospheric and other conditions. If the industries using electric motors specifically state their requirements (including any special conditions in which the motors have to work) to the indigenous manufacturers from whom they purchase motors, it may be possible for the manufacturers to manufacture motors to those requirements. One way of ensuring good quality would be to provide facilities for type testing as well as testing under actual conditions and for certificates to be issued by the institution where the motors are tested, embodying the results of the tests. This will enable manufacturers to furnish evidence regarding the quality of their product to the purchasers.

Prejudice against indigenous electric motors is much less now than it was six years ago, but some of the consumers still show preference for imported motors.

Tariff protection.—The electric motors industry has enjoyed protection for nearly 7 years. The first inquiry into its claim for protection was held by the Tariff Board in 1946-47, as a result of which protection was granted in September 1948 to all types of electric motors and the existing revenue duty of 10 per cent. *ad valorem* was converted into an equivalent protective duty to remain in force up to March 31, 1950. The second inquiry into the industry was held by the Tariff Board in 1949. On the recommendations of the Board the protective rate was restricted to electric motors of the types actually manufactured in India *i.e.*, motors up to 20 H. P. as well as component parts of such motors and the protection was extended up to March 31, 1953. Subsequently in consultation with the Tariff Commission protection was further extended up to December 31, 1955. The Tariff Commission held another inquiry into the industry in 1955 as a result of which protection has been granted for a further period of 3 years *i.e.*, up to December 31, 1958. Since September 7, 1955 a protective duty at the rate of 15 per cent *ad valorem* has been levied on imports of squirrel cage induction motors of horse-power above 20 and up to and inclusive of 100 and of slipring motors of horse-power ranging from 1 to 100 inclusive, but excluding flame proof motors and variable speed commutator motors. A protective duty at the rate of 20 per cent. *ad valorem* has also been levied on component parts of motors specified above but excluding control gear for the same.

Prices of electric motors.—A comparative statment of fair ex-works prices plus margin for contingencies and freight disadvantage of indigenous electric motors of certain types and H. P. and c. i. f. prices of imported electric motors of similar types and H. P. is given below:—

Description of the electric motors (H. P.)	Squirrel cage screen protected drip proof (4 poles)					Totally enclosed fan cooled (4 poles)					Slipring (4 poles)		Loom motors
	(3)	(5)	(7·5)	(10)	(15)	(3)	(5)	(7·5)	(10)	(15)	(25)	(50)	(15)
(Prices in Rupees)													
1. c.i.f. price . .	218	280	340	418	547	323	323	413	507	708	1,031	1,622	238
2. Fair ex-works price plus margin of 4 per cent for contingencies freight disadvantages.	266	337	418	465	631	297	405	490	593	813	1,190	1,945	288

Development Council.—A Development Council for Heavy Electrical Industries was set up in February 1955 under the Industries (Development and Regulation) Act. This Council includes within its purview the electric motors industry also.

II. Programme of Development in the Second Plan.

Estimated requirements.—It is difficult to estimate the demand for electric motors precisely as it ultimately depends upon the industrial development which takes place in the country. With the increasing availability of electric power during the period of the Second Plan, the demand for electric motors will also grow rapidly. The volume and pattern of demand will however depend upon the pace at which various industries develop including those pertaining to the manufacture of capital equipment and machine tools which require motors to be incorporated with them. The Development Council for Heavy Electrical Industries has arrived at the conclusion that the requirements of electric motors up to 200 H. P. may be of the order of 600,000 H.P. per annum by 1960-61 on the basis of a survey conducted by the Central Water and Power Commission some time ago in regard to the number of motors installed during the previous years in various States. The Tariff Commission, which as already mentioned, has estimated the present demand for A. C. motors at about 317,000 H. P. per annum, expects that the demand for electric motors will increase by about 10 per cent each year in the next three years, in view of the increase in the generation of electric power and development of irrigation, greater industrial activity and the tendency to use electric motors for individual drive, instead of group drive for industrial machines. On the whole it seems not unreasonable to expect that the demand for electric motors up to 200 H. P. may reach 600,000 H.P. by 1960-61 as estimated by Development Council for Heavy Electrical Industries.

Additional capacity licensed.—The following schemes with a total additional capacity of 365,700 H. P. have been sanctioned during the First Plan.

Name of the firm	Location	New or additional capacity per annum
		(H. P.)
1. Hindustan Electric Co. (New unit)	Faridabad	65,200
2. Jaura Engineering Works (New unit) *	Chandigarh	1,500
3. Rampur Engineering Co. (New unit)*	Rampur	9,000
4. Motor and Machinery Manufacturers (Expansion)	Calcutta	12,000
5. General Electric Co. of India (Expansion)	Asansol	60,000
6. Kirloskar Electric Co. (Expansion)	Bangalore	144,000
7. Hindustan Equipment Suppliers (New unit)	Kalwa (Bombay)	36,000
8. Bharat Bijlee (Expansion)	Bombay	18,000
9. Orient General Industries (New unit)*	Calcutta	20,000
	TOTAL:	365,700

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* These units are manufacturers of fans and intend to extend their range of manufacture to electric motors also.

Since March 1956, the grant of licences for the expansion of three of the existing firms has been recommended. This will result in a further increase of capacity by about 205,000 H. P. The capacity in the country for electric motors will be of the order of 833,700 H.P. when the above schemes are implemented.

Mention must be made of the Heavy Electrical Equipment factory to be set up at Bhopal under the Ministry of Production in technical collaboration with the Associated Electrical Industries of the U.K. This factory will manufacture, besides other heavy electrical equipment, A.C. industrial motors of 200 H. P. and above with an annual capacity of 50,000 H. P. It is expected that the factory will commence production in about 5 years time. Although the factory will be manufacturing motors of 200 H. P. and above the Government have no objection to existing firms making motors of 250 H. P. or a little higher. Thus overlap in the range of 200 to 250 H. P. between the private and public sectors will be allowed.

Targets of capacity and production.—Since the requirements of electric motors up to 200 H. P. are estimated to be of the order of 600,000 H.P. by 1960-61, production of the same order is envisaged by that year. It is considered that if a capacity of 600,000 H. P. per year is ensured by 1960-61, it would be sufficient to meet the requirements.

In view of the fact that the installed capacity of the industry is expected to be considerably higher than the target of 600,000 H. P. per annum, when all the schemes licensed are completed it does not seem necessary to sanction new projects for augmenting it further. Since this is an important capital goods industry, the progress made in implementing schemes should be watched carefully and steps taken whenever necessary, to ensure achievement of the capacity target.

Requirements of raw materials.—Requirements of the main raw materials for a production target of 600,000 H. P. are estimated to be as follows:—

1. Pig iron and ferrous castings	7,500	tons
2. Electrical steel sheets	7,500	,,
3. Mild steel rods, bars, sheets etc.	1,120	,,
4. Copper wires, strips, ingots and aluminium ingots	950	,,
5. Insulating materials	75	,,
6. Ball and roller bearings	150,000	numbers
7. Insulating paints and varnishes	30,000	gallons

Of these pig iron and ferrous castings, mild steel rods, bars and sheets and ball and roller bearings are available indigenously. Some of the consumers complain of the unsatisfactory performance of indigenously manufactured ball bearings. Steps have however already been taken to improve the quality of ball and roller bearings. Insulating materials have to be imported, while electrical steel sheets, copper wires, strips, ingots and aluminium ingots; and insulating paints and varnishes are partly imported and partly available indigenously. The silicon steel sheets now available in the country are not of the required standard and the quantity is small compared with the actual requirements. The manufacture of these steel sheets could be taken up under the expansion schemes of the steel industry. It is expected that the requirements of insulating materials and of aluminium ingots will be available from indigenous manufacturers during the period of the Second Plan.

The following table summarises the development of the electric motors industry envisaged during the period of the Second Plan.

	1955-56	1960-61
Annual capacity (a) (H. P.)	263,000	600,000
Production (a) (H. P.)	*271,000	600,000

* Estimated.

(a) Exclusive of the Heavy Electrical Equipment Project.

17. ELECTRIC CABLES AND WIRES

I. Review of Progress in the First Plan.

Targets.—The First Plan for electric cables and wires contemplated the following expansion of annual installed capacity:

	Annual installed capacity	
	1950-51	1955-56
(i) A. C. S. R. cables (tons)	2,500	5,000
(ii) Insulated aluminium conductors (tons)	Nil	500
(iii) Bare copper conductors (tons)	20,000	Target not laid down.
(iv) Winding wires (tons)	450	1,100
(v) Rubber & plastic insulated cables & flexibles (Million yards)	65	119
(vi) Telegraph and telephone wires & cables (miles)	Nil	470
(vii) Paper insulated power cables (miles)	Nil	400

The above targets were to be achieved mainly by the execution of the development programmes of the Indian Cable Co., the National Insulated Cable Co. of India, the Aluminium Industries, Kundara and the Government Dry Core Cable Factory. The progress achieved during the First Plan is discussed below.

Capacity and production.—(i) *A. C. S. R. conductors and insulated aluminium conductors.*—In 1950-51 the capacity of the two units manufacturing A. C. S. R. conductors was 2,500 tons per annum. These two units were (i) the Aluminium Industries, Kundara and (ii) the National Insulated Cable Co. of India, Calcutta with capacity of 2,000 tons and 500 tons respectively. Since then the Aluminium Industries have expanded their capacity to 6,000 tons per annum and the National Insulated Cable Co. of India to 1,200 tons per annum. One of the premier manufacturers of cables and wires *viz.*, the Indian Cable Co. has also started production of A.C.S.R., conductors with a capacity of 1,820 tons per annum. Besides, two new units started production during the period of the Plan. They are (i) the Electrical Manufacturing Co., Dum Dum (capacity 1,350 tons) and (ii) the Hindustan Electric Co., Faridabad (capacity 3,000 tons). Thus the present capacity for A. C. S. R. conductors in the country is 13,370 tons per annum.

The manufacture of insulated aluminium conductors has not been started yet in the country.

(ii) *Bare copper conductors.*—There were two units manufacturing bare copper conductors at the beginning of the Plan period *viz.*, the Indian Cable Co. and the National Insulated Cable Co. of India, each with a capacity of 10,000 tons per annum. Two plants for the manufacture of bare copper conductors which were under installation at the commencement of the Plan (the National Screw and Wires Products, Calcutta and the Jaipur Metals and Electricals, Jaipur with annual capacity of 3,600 tons and 3,000 tons respectively) went into production in July 1951. In addition, another unit *viz.* the Jayant Metal Manufacturing Co., Bombay was registered for the manufacture of bare copper conductors under the Industries (Development and Regulation) Act with a capacity of 1,200 tons per annum. Thus, the present annual capacity for bare copper conductors is 27,800 tons.

(iii) *Winding wires.*—The capacity for winding wires in 1950-51 was 450 tons per annum and the target set in the Plan was 1,100 tons. The Indian Cable Co., have increased their capacity for paper and cotton covered wires to 576 tons per annum. The National Insulated Cable Co. of India have also established a capacity of 180 tons per year of cotton and paper covered wires and have a capacity of 96 tons per year for enamelled copper wire. One new unit, the Indian Insulation Industries, Bombay started the production of enamelled copper wire during the period of the Plan, with an annual rated capacity of 300 tons. At present the total capacity in the country for winding wires, including enamelled copper wire is 1,152 tons per year as against the target of 1,100 tons.

(iv) *Rubber and plastic insulated cables.*—The annual rated capacity for rubber and plastic coated cables was 65 million yards in 1950-51. It covered the capacity of the Indian Cable Co. (25 million yards of rubber insulated cables), the National Insulated Cable Co. of India (20 million yards of rubber insulated cables) and the Radio and Electrical Manufacturing Co. (20 million yards of plastic cables). The present annual rated capacity for rubber and plastic coated cables as claimed by the manufacturers is 156.8 million yards as against a target of 119 million yards set by 1955-56. The increase in capacity is due to expansion of the Indian Cable Co. to 67.8 million yards per annum for rubber and plastic coated cables and of the National Insulated Cable Co. of India to 48 million yards per annum of rubber coated cables and the coming into production of two new units *viz.* (i) the Korula Rubber Co., Bombay (capacity 18 million yards of rubber insulated cables per annum) and the South India Rubber Works, Bombay, (capacity 3 million yards of rubber insulated cables per annum).

(v) *Telegraph and telephone cables and wires.*—The Government Dry Core Cable Factory (the Hindustan Cables) started production in September 1954. The factory has been planned to produce 470 miles length of cables of different specifications valued at Rs. one crore. Production up to the end of March 1955 was 112 miles. It has since been possible for the factory to increase its production which during 1955-56 is estimated to have been 525 miles.

(vi) *Paper insulated power cables.*—The Indian Cable Co. have installed about 70 per cent of the plant and machinery required for the manufacture of paper insulated power cables, but have not started production yet. The firm will have a capacity of 384 miles per annum when in full production.

The State-wise distribution of the electric cables and wires industry is given below:—

Annual installed capacity

State	Number of units	Bare copper conductors (Tons)	A. C. S. R. conductors (Tons)	Winding wires including enamelled copper wire (Tons)	Rubber and plastic insulated cables (Million yards)
West Bengal	3	13,600	2,550	276	48·0
Bombay	4	1,200	..	300	21·0
Bihar	1	10,000	1,820	576	67·8
Rajasthan	1	3,000	..	..	..
Travancore-Cochin	1	..	6,000	..	..
Mysore	1	..	..	..	20·0
Punjab	1	..	3,000	..	..
TOTAL	12	27,800	13,370	1,152	156.8

Actual production of various types of cables and wires during the last six years has been as follows:—

Year	A. C. S. R. conductors (Tons)	Bare copper conductors (Tons)	Winding wires (Tons)	Rubber insulated cables & flexibles (Million yards)	Telephone cables (Miles)
1950-51	*1,349	4,963	254	39·4	..
1951-52	*1,720	2,852	358	41·3	..
1952-53	*2,381	7,522	383	36·2	..
1953-54	*3,280	6,721	156	**50·4	..
1954-55	5,663	8,851	418	**72·1	‡112
1955-56	8,730	8,535	668	**86·80	525

* Figures relate to calendar years.

** Includes production of plastic insulated cables and flexibles.

‡ Production started in September 1954.

Imports and exports.— In accordance with the import policy for January—June, 1956 imports of bare hard drawn electrolytic wires and cables and copper wire are banned. Paper insulated power cables are on O. G. L. up to September 30, 1956. As regards rubber insulated cables and wires, the established importers are allowed to import certain categories of cables and wires of 250 volts and 660 volts grade to the extent of 20 per cent of half of the best year's imports from soft currency areas. For rubber insulated cables and wires not covered by the restricted varieties the quota to the established importers is 100 per cent of half of the best year's imports. Imports of A. C. S. R. and all aluminium conductors is allowed to established importers on the basis of 10 per cent of half of the best year's imports from soft currency areas.

The imports of different varieties of cables and wires have been as follows during the last few years:—

Year	Bare copper wire other than telegraph and telephone wires		Rubber insulated cables, wires and flexibles	Cables, wires & flexibles insulation other than rubber & others not specified	Telegraph and telephone wires and cables	Total
	Quantity (Tons)	Value (Rs. lakhs)	Value (Rs. lakhs)	Value (Rs. lakhs)	Value (Rs. lakhs)	Value (Rs. lakhs)
1950-51	67·3	2·1	1,23·9	1,97·0	88·7	4,11·7
1951-52	104·7	3·5	51·9	2,50·4	3·5	3,09·3
1952-53	2,567·8	1,19·3	78·3	6,14·7	12·7	8,25·0
1953-54	1,893·7	67·5	97·1	4,84·6	1,04·8	7,54·0
1954-55	190·6	9·8	53·7	2,87·4	51·6	4,02·5
1955-56 (Ten months, April—January)	159·7	9·9	78·4	4,10·9	9·8	5,09·0

It will be seen that the imports of telephone cables which were valued at Rs. 51·6 lakhs during 1954-55 have come down to Rs. 9·8 lakhs in 1955-56 (April–January). This fall in imports is due to the coming into production of the Hindustan Cables in September 1954. There will be no need for imports of telephone cables in future as the factory will normally take care of all the requirements.

The industry has not been able to establish export markets to any appreciable degree.

Consumption.—In 1950-51 the demand for various types of cables and wires was as follows:—

Bare copper conductors	6,000/7,000 tons per annum.
Rubber and plastic insulated cables & flexibles	65 to 80 million yards per annum.
Winding wires	1,250 tons per annum.
A. C. S. R. cables	5,000 tons per annum.

It was considered that the future rate and pattern of demand would depend upon a number of factors such as the rate of generation of electricity, completion of various multi-purpose projects, industrial and housing expansion schemes and the relative availability of competing raw materials like copper and aluminium. The demand of winding wires was expected to increase as a result of larger production of fans, electric motors and transformers. It was envisaged that on the whole the demand for the various items produced by the industry would increase by approximately 40 to 50 per cent by 1955-56 and would be as under:—

1. Bare copper conductors	10,000 tons per annum.
2. Rubber & plastic insulated cables & flexibles	105 million yards per annum.
3. Winding wires	1,875 tons per annum.
4. A. C. S. R. cables	8,000 tons per annum.

As data regarding the electric cables and wires imported into the country is not forthcoming for the all years, it is not possible to give the actual quantities available for consumption. However, import data with regard to quantities for various items is available for 1954-55 and 1955-56 and the actual quantities available for consumption based on production and imports for this period is given below:—

		1954-55			1955-56		
		Production	Imports	Actual quantity available for consumption	Production	Imports	Actual quantity available for consumption
Bare copper conductors	(Tons)	8,851	190·6	9,041·6	8,535	175	8,710
A. C. S. R. conductors	(„)	5,663	295·2	5,958·2	8,730	280	9,010
Rubber & plastic insulated cables & flexibles	(Million yards)	72·1	28·1	100·2	86·9	36·2	123·1

The consumption of winding wires including enamelled copper wire on the basis of production levels of transformers, electric motors and fans in 1955-56 is estimated to be of the order of about 2,000 tons. It will be seen that the demand for A. C. S. R. conductors is rising at a faster rate compared to bare copper conductors. This is due to the present trend of using more A. C. S. R. conductors for power transmission owing to short supplies and high cost of electrolytic copper.

Development Council.—A Development Council for Heavy Electrical Industries was set up in February 1955. The electric cables and wires industry comes within the purview of this Council.

Capital and labour.—A sum of about Rs. 3 crores is esimated to have been invested in the cables and wires industry during the Plan period. The major investment has been made by the Indian Cable Co. for their expansion programmes. In addition a sum of Rs. 1·6 crores has been spent on the factory of the Hindustan Cables in the public sector.

The number of persons employed at present in the electric cables and wires industry is estimated to be of the order of 3,800.

Problems of the industry.—The major difficulties facing the organised manufacturers are (*a*) competition from sub-standard goods in the field of rubber cables from smaller units (*b*) the higher rate of duty on aluminium rods required as raw material compared to the duty on A. C. S. R. cables and (*c*) shortage of supplies of aluminium.

II. Programme of Development in the Second Plan

Estimated requirements and targets of capacity and production.—The demand for cables and wires depends mainly upon the extent to which power is transmitted and distributed, and this cannot be foreseen with any great precision. Since, however, during the Second Plan period 10,000 villages are expected to be electrified the demand for wires and cables will certainly increase to a considerable extent.

(i) *A. C. S. R. conductors.*—At the commencement of the First Plan it was envisaged that the demand for A. C. S. R. conductors would increase from 5,000 tons per annum in 1950-51 to 8,000 tons by 1955-56. The present demand (*i.e.* in 1955-56) for A. C. S. R. conductors is of the order of 9,000 tons per annum. The Central Water and Power Commission have provisionally estimated that the requirements for A. C. S. R. conductors will go up to 18,000 tons by 1960-61.

The present capacity in the country for A. C. S. R. conductors is 13,370 tons per annum. The Hindustan Electric Co. have been licensed to set up a new factory at Ulhasnagar (Bombay) with a capacity of 5,000 tons per annum, while the National Insulated Cable Co. of India have been allowed to expand their capacity by 1,200 tons per annum. The Aluminium Corporation of India, J. K. Nagar have also been licensed for the manufacture of A. C. S. R. conductors with a capacity of 2,000 tons per annum. With the implementation of these schemes the capacity for A. C. S. R. conductors will increase to 21,570 tons per annum which will be sufficient for achieving a production of 18,000 tons by 1960-61.

(ii) *Bare copper conductors.*—The demand for bare copper conductors was 6,000 to 7,000 tons in 1950-51 and it was expected to rise to 10,000 tons by 1955-56. The actual quantity available for consumption during 1955-56 is estimated to have been about 8,700 tons. The present trend is towards increasing use of aluminium conductors as the price of copper is comparatively higher. Nevertheless the demand for the bare copper conductors is expected to increase to some extent and the requirements by 1960-61 are placed at about 10,000 tons per annum as in the First Plan.

The present capacity for bare copper conductors is 27,800 tons per annum. It is considered that this capacity is more than enough to meet all the probable requirements in 1960-61.

(iii) *Winding wires.*—Winding wires are mostly consumed by the transformers, electric motors and fans industries and also for radios and chokes for fluorescent tube lighting, etc. The target of production during the Second Plan for transformers, electric motors and fans has been placed at 1·36 million KVA, 600,000 H. P. and 600,000 numbers, respectively. Having regard to these targets, it is expected that the demand for winding wires including strips will be about 4,000 tons by 1960-61.

The capacity for winding wires at present in the country is 1,152 tons per annum, including enamelled copper wire. The Indian Cable Co. who were granted a licence in 1953 have installed most of the plant and machinery for the manufacture of enamelled copper wire and will have a capacity of 444 tons per annum, when production starts. The firm has also been allowed to expand its capacity for cotton and paper covered wires by an additional 144 tons. The National Insulated Cable Co. of India have been licensed to expand their capacity for cotton and paper covered wires by an additional 240 tons and that for enamelled copper wire by 96 tons. Besides, six new firms have been licensed for the manufacture of enamelled copper wire with a total additional capacity of 2,410 tons per year. The total capacity for winding wires including enamelled copper wire will be of the order of 4,486 tons per annum, when all the schemes mentioned above are implemented. Further expansion of capacity in this sector does not seem to be necessary in the Second Plan.

(iv) *Rubber and plastic insulated cables.*—The present requirements of rubber and plastic insulated cables and flexibles are of the order of about 112 million yards per annum (average quantity available for consumption during the last two years). An increase in demand of 15–18 per cent per annum during the period of the Second Plan is anticipated. Thus, the demand by 1960-61 will be of the order of 250 million yards.

The present capacity in the country for rubber and plastic coated cables is 156·8 million yards. Four expansion schemes and one scheme for a new unit have been licensed with an additional capacity of 177 million yards per annum. This will bring the total capacity for rubber and plastic insulated cables to 334 million yards per annum. It is considered that there is no need for any extra capacity for rubber and plastic insulated cables. The demand can be met if a capacity of 250 million yards is ensured.

Telegraph and telephone cables and wires.—The demand for armoured cables from the Posts and Telegraphs Department have, according to present estimates,increased to 800 miles per annum. The factory of the Hindustan Cables has a rated capacity of 470 miles per annum, but the actual production of the factory has been estimated at 525 miles in 1955-56. The capacity is being doubled and the factory will be able to produce 1,000 miles of cables per annum by the end of 1956. This may leave a small surplus for exports, after meeting the requirements of the Posts and Telegraphs Department and other Government departments like Railways and Defence.

During the Second Plan, the Posts and Telegraphs Department are proposing to link major cities in India by an underground telephone cable network. To meet the requirements it is proposed to take up the manufacture of 300 miles of coaxial trunk cables per annum in the factory of the Hindustan Cables.

Paper insulated power cables.—Paper insulated power cables are not being manufactured in the country at present but the Indian Cable Co. who were granted a licence in 1953 have installed most of the machinery and plant for their manufacture and will have a capacity of 384 miles per annum. Besides another new unit, *viz.*, the Osler Cable Co., Bombay, has been licensed to manufacture 370 miles per annum of this item. The total capacity on completion of the two schemes will be 754 miles per annum. The demand for paper insulated power cables has been put at 600 miles per annum by 1960-61 by the Development Council. It is considered that the capacity of 754 miles to be achieved by the completion of the two schemes will be sufficient to meet the requirements of 1960-61.

Schemes licensed.—The statement below summarises the details of the schemes licensed which have been mentioned above:

Name of the firm	Location	New or additional capacity per annum	
1. Indian Cable Co. (expansion) . .	Tatanagar	Enamelled copper wire	444 tons
		Paper and cotton covered wire	144 tons
		Rubber insulated cables	57 million yards
		Paper insulated power cables	384 miles
2. Hindustan Electric Co. (new unit) .	Ulhasnagar (Bombay)	A. C. S. R. conductors	5,000 tons
3. National Insulated Cable Co. of India (expansion)	Calcutta	A. C. S. R. conductors	1,200 tons
		Enamelled copper wire	96 tons
		Paper and cotton covered wire	240 tons
		Rubber insulated cables	36 million yards
4. Aluminium Corporation of India (manufacture of new articles)	J. K. Nagar	A. C. S. R. conductors	2,000 tons
5. Bharat Ram Charat Ram (new unit) .	Delhi	Enamelled copper wire	360 tons
6. Hindustan Wire Products (new unit) .	Patiala	Enamelled copper wire	500 tons
7. Hindustan Transmission Products (new unit)	Faridabad	Enamelled copper wire	325 tons
8. Everlite Electric Co. (new unit) . .	Bombay	Enamelled copper wire	300 tons
9. A. Roy and Sons (new unit) . .	Rewari	Enamelled copper wire	325 tons
10. Aluminium Industries (manufacture of new articles)	Kundara	Rubber insulated aluminium cables for overhead service connection	3 million yards
11. South India Rubber Works (expansion) .	Bombay	Rubber insulated cables	9 million yards
12. Osler Cable Co. (new unit) . . .	Sewri (Bombay)	Rubber insulated cables	72 million yards
		Paper insulated power cables	370 miles
13. K. J. Awatramani (new unit) . .	Bombay	Enamelled copper wire	600 tons.

Raw materials.—The requirements of principal* raw materials for the target of production envisaged by 1960-61 have been roughly estimated as follows:—

	Quantity (tons)
1. Iron and steel	10,000
2. Copper	20,000
3. Aluminium	13,000
4. Other non-ferrous metals	3,000
5. Paper & paper-board	800
6. Textile & yarn	500
7. Impregnating compound	1,000
8. Chemicals, all sorts, rubber, etc.	6,000

*Excludes the raw materials required for telephone cables, coaxial trunk cables estimated in terms of value at about Rs. 2·0 crores. The requirements of Hindustan Cables in 1960-61 in respect of major raw materials are: Copperwires, 1,500 tons; steel tapes, 1,766 tons; antimonial lead and lead antimony alloys, 3,500 tons; steel armouring tape, 450 tons; and bitumen, 1,235 tons.

The following table summarises the programme of development for the electric cables and wires industry duing the period of the Second Plan:—

		1955-56		1960-61	
		Capacity	Production	Capacity	Production
1. A. C. S. R. conductors	(Tons)	13,370	8,730	21,570	18,000
2. Bare copper conductors	,,	27,800	8,535	27,800	10,000
3. Winding wires	,,	1,152	668	4,486	4,000
4. Rubber and plastic coated cables & flexibles	Million yards	156·8	86·89	334·0	250·0
5. Telephone cables	Miles	470	525	1,000	1,000
6. Coaxial trunk cables	,,	..	..	300	300
7. Paper insulated power cables	,,	..	..	784	600

18. ELECTRIC FANS

I. Review of Progress in the First Plan

Targets.—The First Plan envisaged the annual rated capacity of the electric fans industry at 360,000 fans by 1955-56 as against a capacity of 288,000 in 1950-51.

The domestic demand for electric fans was estimated to increase to 320,000 per annum by 1955-56. Allowing 30,000 fans for exports, a production target was set of 320,000 to 350,000 fans per year by the end of the period of the First Plan.

Capacity and production.—In 1950-51 the capacity of the 22 units manufacturing electric fans on the active list of the Development Wing of the Ministry of Commerce and Industry was assessed at 288,000 fans per year. Some of the units were subsequently removed from the active list of the Development Wing and the capacity of 18 units recognised as regular and established manufacturers stood at 293,000 at the end of 1952 and 303,000 at the end of 1953. Two units were added to the list of the Development Wing in 1954 and the capacity of the 20 units was assessed in that year at 335,700 fans per year. Since then, one of the existing units, *viz.* the Jay Engineering Works, Calcutta, who were granted a licence for a substantial expansion in 1954, have expanded their capacity from 48,000 to 120,000 fans per year and another unit in West Bengal with a capacity of 6,000 has ceased production. Thus the present capacity of the 19 organised units comes to 401,700 fans per year. The State-wise distribution of the industry is given below:—

State	Number of units	Annual rated capacity (Numbers)
West Bengal	11	313,200
Bombay	4	62,000
Delhi	3	25,500
Uttar Pradesh	1	1,000
TOTAL	19	401,700

As against a target of 320,000 to 350,000 fans per annum by 1955-56, the actual production of fans since 1950-51 has been as follows:—

Year	Production ('000 numbers)
1950-51	194·1
1951-52	215·0
1952-53	189·0
1953-54	208·0
1954-55	256·0
1955-56 (Nine months, April—December)	210·0
1955-56 (Estimated)	280·0

It will be seen that with slight variation production remained at about 200,000 units per annum in the first three years of the Plan. It improved by about 30 to 40 per cent in the following two years, but has fallen a good deal short of the target.

Imports and exports.—Imports of ceiling fans and parts are banned. As regards table fans, the policy for January-June 1956 permits the established importers 20 per cent of half of their best year's imports from soft currency areas. Industrial exhaust fans and blowers are allowed to be imported liberally. Imports of electric fans are recorded only in terms of value in the Foreign Trade and Navigation Accounts of India. Imports of "electric fans and parts thereof" have been as follows during the last six years:—

Year	Imports (Rs. lakhs)
1950-51	3·2
1951-52	5·5
1952-53	4·5
1953-54	6·8
1954-55	12·5
1955-56 (Ten months, April—January)	14·7

Exports of electric fans were expected to reach a figure of about 30,000 per year by 1955-56. Statistics of exports for electric fans are not available for all the years. However, the exports of electric fans during the years 1952-53, 1954-55 and 1955-56 (ten months, April to January) were 3,655, 10,869 and 14,241 valued at Rs. 4·9 lakhs, Rs. 13·6 lakhs and Rs. 17·2 lakhs respectively.

It was recommended in the First Plan that a rebate should be allowed on the import duty paid on raw materials used in the manufacture of fans for export. Draft rules relating to the drawback of duty on imported raw materials have been published. According to these rules the rate of drawback of duty will be seven-eighths of the average amount paid on all or any of the imported raw materials used in the manufacture of fans to be exported. This will help the manufacturers to reduce the cost of production and an increased export market is expected to be developed as a result.

Consumption.—The Development Wing estimated the demand for electric fans at 212,000 per year in 1951, consisting of 140,000 ceiling fans, 60,000 table fans and 12,000 railway carriage fans. The Tariff Board in its report (1951) on the Electric Fans Industry estimated the demand in 1951 at 212,000 to 232,000 and expected it to rise to 275,000 per annum by the end of 1954. The Planning Commission estimated that the demand for electric fans would increase to 320,000 per year by 1955-56 on the basis of the increased power supply expected to be developed under the First Plan. Since imports and exports of electric fans have not been appreciable during the period of the Plan, the indigenous production may be taken as indication of demand. This shows that there has not been any notable increase in consumption since 1950-51 except in the last two years. If the production in these two years, *viz.* 1954-55 and 1955-56 can be regarded as representing the normal demand, then the present demand for electric fans in the country may be roughly estimated at 250,000 to 280,000 per year.

Capital and labour.—According to the Census of Manufactures the fixed capital investment in 21 fan manufacturing units was about Rs. 1,02·2 lakhs in 1953. The number of persons employed at present in the 19 units on the list of the Development Wing is about 5,400.

Action on main recommendations.—It was recommended in the Plan that apart from improving the quality of indigenous fans, the industry should take up the manufacture of industrial fans and other special kind of fans which were not being manufactured at the beginning of the Plan period. The quality of indigenous fans has since been considerably improved and almost all types of fans are now being manufactured in the country.

Development Council.—Early in 1955 a Development Council was set up for Light Electrical Industries under the Industries (Development and Regulation) Act. This Council includes within its purview the electric fans industry also.

II. Programme of Development in the Second Plan

Estimated requirements.—It is difficult to forecast with any accuracy the likely increase in demand for electric fans during the period of the Second Plan. However, with the rise in the standard of living that is expected over the next five years and the more extensive availability of electric power, the demand for electric fans will certainly go up. The Development Council for Light Electrical Industries has estimated that the demand for electric fans may be of the order of 450,000 per year by 1960-61. This figure may be on the low side and it is perhaps reasonable to expect the domestic demand for electric fans to reach a figure somewhere between 500,000 to 550,000 per year by 1960-61. Now that arrangements have been made for drawback of import duty on materials used in the manufacture of fans for export, there appears to be good prospects of expanding exports which may perhaps rise from the present level of 17,000 (estimated for 1955-56) to 40,000 to 50,000 by 1960-61. On this basis the total requirements of electric fans by 1960-61 would come to about 550,000 to 600,000 per year.

Targets of capacity and production.—Since the total requirements of electric fans are estimated to be of the order of 600,000 by 1960-61 production of the same order is envisaged by that date. In the case of an industry like electric fans, there is scope for multi-shift operations. It is therefore considered that a target of capacity of 600,000 fans per year on single shift would be adequate to achieve production of the same order.

Schemes licensed and under implementation.—Licenses have been granted to three firms to expand their capacity, details of which are given below:—

Name of the firm	Present annual capacity (Numbers)	Annual capacity after expansion (Numbers)
1. *Jaura Engineering Works, Amritsar	1,200	3,600 The factory is to be shifted to Chandigarh.
2. Rampur Engineering Co., Rampur	1,000	30,000
3. Bharat Electrical Industries, Calcutta	†3,500	36,000

* The unit is not at present on the active list of the Development Wing.

† A capacity of 9,000 fans per annum is claimed by the firm, but it is 3,500 fans per annum as assessed by the Development Wing.

The capacity of the electric fans industry will be 466,800 when the above three schemes of expansion are completed.

Additional capacity required.—In view of the fact that the installed capacity of the industry is expected to increase to 466,800 fans per annum when all the schemes licensed are completed, a further increase in capacity of only about 133,200 fans will be necessary to achieve the target capacity of 600,000 fans by 1960-61. In licensing further capacity weight should be attached to the expansion of existing units to minimum economic size and the establishment of new units in relatively under-developed areas.

Requirements of raw materials.—The requirements of raw materials for a production target of 600,000 fans are estimated to be as follows:—

Raw materials	Quantity	
i. Pig iron/castings	6,000	tons
ii. Electrical steel sheets	8,000	"
iii. Winding wires including resistance wires	850	"
iv. Mild steel sheets, plates, bars, rods and pipes	2,600	"
v. Bare copper strips and wires and other non-ferrous materials such as brass sheets, wires, etc.	900	"
vi. Aluminium ingots and sheets	820	"
vii. Insulating materials	70	"
viii. Varnishes, paints and thinners	136,400	gallons
ix. Ball bearings	900,000	numbers
x. Oil retaining bearings	340,000	"
xi. Condensers	*450,000	"

* The tendency to use condensers for A. C. fans is increasing day by day and the figure is only a rough estimate.

The following table summarises the development of the electric fans industry envisaged during the period of the Second Plan:—

		1955-56	1960-61
Annual capacity	(Numbers)	401,700	600,000
Production	"	†280,000	600,000
Domestic consumption	"	280,000	550,000
Exports	"	†17,000	50,000

† Estimated.

19. ELECTRIC LAMPS

I. Review of Progress in the First Plan

Targets.—The Planning Commission envisaged that the capacity for G. L. S. (General Lighting Service) type of lamps would increase from 23 millions in 1950-51 to 32·5 millions by the end of 1955-56. The capacity for miniature bulbs was expected to increase from 0·9 million to 27·5 millions.

The demand for G. L. S. type of lamps which was estimated at 16 millions in 1950-51 was expected to rise to 30 millions in 1955-56. The full requirements were expected to be met from indigenous sources and, therefore, a production target was fixed of 30 million G. L. S. lamps per annum to be achieved by the end of the Plan period. A production target of 16 millions was visualised for miniature bulbs. No target was fixed for the production of fluorescent tubes.

Capacity and production.—(i) *G. L. S. lamps.*—At the beginning of the First Plan, there were ten units with a capacity of 23 million pieces per annum of G. L. S. type of lamps (estimated on the basis of single shift operation and 300 working days). A new unit, *viz.* the Osler Electric Lamp Manufacturing Co., Bombay, with an annual rated capacity of 3 million lamps went into production in 1952. Since then this firm has further increased their capacity to 5 million lamps per annum with the installation of a balancing plant. During 1953, one of the existing units, *viz.* the Hind Lamps expanded their capacity from 3 million to 6 million lamps per annum. As a result, the total capacity of the industry was stepped up to 31 million lamps per annum by the end of 1953. Since then there has been no further addition to capacity so that it has to be rated at 31 million lamps per annum at the end of the Plan period. However, according to a detailed technical assessment of the capacity undertaken recently by the Development Wing, it is now placed at 36·0 million lamps per annum.

(ii) *Fluorescent tubes.*—A new line of production undertaken during the First Plan period is the manufacture of fluorescent tubes. The Electric Lamps Manufacturers (India), who are the only manufacturers of fluorescent tubes at present, started their production in 1952. To begin with, they had a capacity of 400,000 tubes per annum which was stepped up to 800,000 tubes per annum in 1953.

(iii) *Miniature bulbs.*—In the year 1951, there was only one firm producing miniature bulbs with a capacity of 0·9 million pieces per annum. The following firms went into production during the period of the Plan:—

Name of the firm	Capacity
	(Million numbers)
1. Pradip Lamp Works	6·0
2. Glass and Miniature Bulb Industries	3·0
3. G. G. Paranjpe	0·6
4. Auto Lamps	0·7

As a result of the establishment of these new units the total capacity of the industry at the end of 1955-56 reached 11·2 million miniature bulbs per annum.

The present regional distribution of the industry is indicated below:—

State	Number of of units	Annual rated capacity on single shift basis		
		G. L. S. lamps	Fluorescent tubes	Miniature bulbs
		(Million numbers)	(Numbers)	(Million numbers)
1. Bombay	3	5·35	800,000	0·60
2. Bihar	1	2·60	Nil	6·00
3. Calcutta	6	17·85	Nil	Nil
4. Delhi	1	Nil	Nil	0·70
5. Uttar Pradesh	2	6·85	Nil	3·00
6. Mysore	1	3·30	Nil	0·90
TOTAL	14	35·95	800,000	11·20

The production of various types of lamps increased during the period of the Plan, but falls short of the targets. The actual production during the last five years has been as follows:—

Year	G. L. S. and other types (Million numbers)	Fluorescent tubes (Numbers)	Miniature bulbs (Numbers)
1951	15·51	—	—
1952	20·88	73,000	142,500
1953	19·66	102,000	453,000
1954	22·86	214,000	898,000
1955	23·51	721,100	1,716,719

The production of miniature bulbs is much below the target of 16 million pieces per annum. Apart from the difficulties connected with the supply of raw materials which are mainly imported, large imports of torch bulbs, which account for the bulk of miniature bulbs, from Hongkong and Japan at a very low price have been responsible for keeping the production at a low level. There has, however, been considerable increase in the production of other types of miniature bulbs like auto bulbs.

Types of lamps manufactured.—In addition to the G. L. S. type of lamps, lamps for Railways and train lighting and coloured lamps for decoration are also being produced. The production of fluorescent tubes has also been taken up in the country, as already explained.

As regards miniature bulbs, the production of torch bulbs, radio dial lamps, cycle dynamo lamps, auto bulbs, telephone switchboard lamps, etc., has been started.

The manufacture of components such as brass lamp caps for G. L. S. type of lamps has also been taken up. Glass shell production has also been expanded to meet the requirements of the lamp industry.

Imports and exports.—As the production of G. L. S. lamps is less than the installed capacity of the industry, imports are totally banned for G. L. S. lamps up to 500 watts, including frosted, inside white opal and day light blue. Imports of train lighting and cablight lamps are also not allowed. Established importers of G.L.S. lamps up to 500 watts are granted licences for the import of fluorescent tubes on the basis of 10 per cent of half of the best year's imports of G.L. S. lamps. According to the current policy the import of fluorescent tubes is restricted to 66 2/3 per cent of the best year's imports. Out of this up to 25 per cent of the face value of licences can be utilised for imports from dollar areas. The imports of motor car lamps (auto lamps) is restricted to 20 per cent of the best year's imports and only sealed beam- head lights can be imported. These lamps are generally imported from the United Kingdom, Hongkong and Japan.

The imports of all types of lamps since 1950-51 have been as follows :—

	1950-51		1951-52		1952-53		1953-54		1954-55		1955-56 (April to January)	
Type of lamps	Million numbers	Value Rs. lakhs	Million numbers	Value Rs. lakhs	Million numbers	Value Rs. lakhs	Million numbers	Value Rs. lakhs	Million numbers	Value Rs. lakhs	Million numbers	Value Rs. lakhs
1. G.L.S. . .	0·56	7·04	0·58	7·36	0·45	5·49	0·24	4·33	0·72	4·68	3·36	8·99
2. Electric bulbs for automobiles	0·82	4·42	9·93	32·05	5·69	19·81	0·03	0·13	0·05	0·23	0·10	0·39
3. Electric bulbs for torches	16·08	12·26	21·05	27·03	19·72	18·99	19·10	18·01	15·02	10·02	23·41	15·26
4. Others .	1·83	27·88	0·59	16·48	1·56	28·81	2·07	28·09	3·10	24·40	1·64	17·62
5. Fluorescent tubes* . .	..	..	..	..	..	..	..	..	0·70	21·06	0·26	9·08

* Separately specified from April 1954.

Exports of lamps are mainly confined to Pakistan and have remained at a low level. The Far East Countries, however, offer a potential market for lamps. Thailand, for instance, depends entirely on imports for her supplies and obtains her requirements from the United Kingdom, U. S. A., Japan, Italy and Germany. Indian electric lamps can find a market in Thailand provided the finish is good and the prices are competitive. In order to push up sales, the manufacturers should concentrate on production of quality goods and proper advertisement.

Consumption.—The approximate number of G. L. S. lamps, fluorescent tubes and miniature bulbs available for consumption during the last five years based on actual production plus imports (as exports are negligible) has been as follows:—

Year	G.L.S. lamps (Million numbers)	Fluorescent tubes (Million numbers)	Miniature bulbs (Million numbers)
1951-52	16·1	..	31·0
1952-53	21·3	N. A.	25·6
1953-54	19·9	N. A.	19·6
1954-55	23·6	0·9	16·4
1955-56 (Estimated)	27·5	1·0	30·0

According to the trends of production plus imports of the last two years, the demand for G. L. S. lamps has increased to about 25 millions and the present demand for fluorescent tubes can be taken to be about one million pieces per annum. As regards the present demand for miniature bulbs, taking the average of the last five years of production and imports as the basis, the present demand comes to about 23 to 24 millions per year. This is exclusive of torch bulbs which are imported along with complete torches. The number of bulbs so imported comes to 5 to 6 millions per annum.

Capital and labour.—According to the Census of Manufactures, the fixed capital investment in 9 factories out of a total of 14 was Rs. 1,30 lakhs in 1952. The labour employed in the industry was estimated at 2,373 in 1954.

Development Council for Light Electrical Industries.—A Development Council for Light Electrical Industries was set up in early 1955 under the Industries (Development and Regulation) Act, 1951. The Council includes within its purview the electric lamps industry.

Problems of the industry.—According to the Indian Lamp Factories Association the main problem facing the industry has been the lack of demand for electric lamps, as a result of which the industry has not been able to work to full capacity. On numerous representations made by the Association, the Government in 1953 restricted the production of G. L. S. lamps in the case of factories with a capacity of more than one million pieces per annum to 75 per cent of their assessed capacity. With the gradual improvement in the position, this restriction was progressively reduced and ultimately withdrawn with effect from January 1, 1956.

It is stated that the Indian electric lamp industry is experiencing difficulties in getting samples tested at the Government Test House and that the charges for testing are high.

II. Programme of Development in the Second Plan

Estimated requirements.—As discussed earlier, the present domestic demand for G. L. S. lamps is estimated at about 25 million pieces. The demand for electric lamps can be expected to rise substantially with the rapid increase in the generation and distribution of electricity envisaged in the Second Plan. According to the programme drawn up by the Ministry of Irrigation and Power, over 10,000 villages and about 500 small towns are expected to be electrified during the Second Plan period. About 800 small towns and villages were expected to get power supply by 1955-56.

The Development Council for Light Electrical Industries estimated that the demand for G. L. S. type of lamps would be 40 millions and for other lighting lamps, including coloured and decorative lamps, 5 millions by 1960-61. On a further review of the levels of requirements, it has been estimated that the demand might go up to about 50 millions including 5 millions for coloured and other decorative lamps.

The present annual demand for fluorescent tubes is estimated at 1 million. As the use of fluorescent tubes is increasing in factories, mills, offices, show rooms, etc., the Development Council has estimated that the demand by 1960-61 may increase by 100 per cent and reach 2 millions.

The present demand for miniature bulbs is estimated at between 23 to 24 millions. The Development Council is of the opinion that the demand for torch bulbs is not likely to increase abnormally due to the effect of the large-scale electrification schemes. The demand for miniature bulbs has, therefore, been estimated to be of the order of 30 millions by the end of 1960-61.

Targets of capacity and production.—Having regard to the experience already acquired in this industry it should be possible without difficulty to meet the entire demand from indigenous sources. Accordingly, a capacity target of 50 million G. L. S. lamps, 2 million fluorescent lamps and 30 million miniature bulbs per annum on a single shift basis is envisaged by 1960-61. No further capacity is necessary since any additional production required could be achieved by some of the units operating on a multiple shift basis.

Schemes licensed and under implementation.—The following schemes had been sanctioned or recommended for licence up to March 1956.

Name of the firm	Items proposed to be manufactured	Capacity per annum (Numbers)
Bengal Electric Lamps, Calcutta (Expansion)	Fluorescent tubes	900,000
Bharat Electric Industries, Calcutta (Expansion)	Miniature lamps	6 million
Hindustan Lamps and Fluorescent tubes, Calcutta (New unit)	(i) Non-general S. T.	0·48 million
	(ii) Miniature bulbs	2·7 million
Shri B. Chowdery of Bombay (New unit)	Mercury vapour lamps	30,000
Hind Lamps, Shikohabad (Expansion)	Miniature lamps	6 million

After March 1956, one new unit and three expansions of existing units have been recommended for the grant of licence for the manufacture of 1·542 million fluorescent tubes per annum.

When these schemes are implemented, the capacity for fluorescent tubes will increase to 3·242 millions and for miniature bulbs to 25·9 millions per annum. There will be no addition to the capacity for G. L. S. lamps.

The manufacture of certain component parts is also proposed to be undertaken. At the commencement of the Plan the industry was entirely dependent on imports for the supply of most of the raw materials and components. These raw materials were short throughout the world and difficulties were experienced in their procurement. It was, therefore, considered desirable to set up feeder ancillary industries for the manufacture of brass caps, glass tubes and rods, basing cement, etc. The Hind Lamps have been given a licence for the manufacture of brass caps and glass tubes and the Bengal Electric Lamps, Calcutta, a licence for the manufacture of pieces of glow switches for fluorescent tubes.

Additional capacity required.—After allowing for new schemes already under implementation or approved it will be necessary to bring into existence the following extra capacity:

G. L. S. and other types	14 million numbers
Miniature bulbs	4·1 million numbers

This additional capacity can be secured preferably by the expansion of existing units. In practice, it might be desirable to give first preference to the expansion of small units to economic size.

Investment and employment.—It is roughly estimated that an investment of about Rs. 50 lakhs will require to be made during the Second Plan period to achieve the capacity target envisaged above. It is further estimated that the industry will provide employment to 1,000 to 1,200 persons.

Requirements of raw materials.—During the Second Plan period the industry will continue to depend on imports for a number of raw materials particularly tungsten filament and molybdenum wires. The industry will be able to obtain from indigenous sources glass tubing and rods which have been imported up till now. Barium carbonate, sodium nitrate, borax, etc. will also be available from indigenous sources to some extent.

The requirements of the principal raw materials for the target of 50 million G. L. S. and other types of lamps, 2 million fluorescent tubes and 30 million miniature bulbs by 1960-61 will be approximately as follows:—

	Quantity		Value (Rs. lakhs)
1. Glass tubing and rods	1,250	tons	43·0
2. Chemicals	50	,,	5·0
3. Tungsten wires and coiled filaments	70	million meters	48·5
4. Molybdenum wire	7·0	,, ,,	2·5
5. Solder wire (Multi-rosin-cored)	30	tons	1·9
6. Capping cement	155	,,	5·6
7. Argon and nitrogen gases	2,000,000	cubic ft.	18·8
8. Leading in wires	130	million pieces	6·5
9. Brass caps	93	,, ,,	37·0
10. Glass shells	55	,, ,,	55·0
11. Steel Mandrill wire	2·5	tons ,,	1·4
12. Hoto Phosphate	35,000	lbs.	10·0

The following table summarises the programme of development for the electric lamps industry during the period of the Second Plan.

	1955-56	1960-61
G.L.S. & other types		
Capacity (million numbers)	36·0	50·0
Production (,,)	27·0*	50·0
Fluorescent tubes		
Capacity (numbers)	800,000	2,000,000
Production (,,)	750,000*	2,000,000
Miniature bulbs		
Capacity (million numbers)	11·2	30·0
Production (,,)	1·8*	30·0

* Estimated.

20. DRY BATTERIES

I. Review of Progress in the First Plan

Targets.—At the commencement of the First Plan, there were four units in the country engaged in the manufacture of dry cells. The total annual rated capacity of these four units was estimated by the Tariff Board (1950) at 285 million cells. This capacity was expected to be augmented by 25 million cells as a result of the expansion programme of the National Carbon Company envisaged under the First Plan, bringing the total capacity to 310 millions. Since this capacity was considered adequate to meet the estimated demand of 320 million dry cells by 1955-56, no further expansion in capacity was envisaged during the Plan period.

Capacity and production.—The capacity of the industry estimated by the Tariff Board (1950) at 285 million cells per year, was reassessed in 1952 by the Development Wing of the Ministry of Commerce and Industry at 196·5 million cells per annum on a single shift basis. Although one of the units with a capacity of 4·5 million cells per year went out of production after 1952, the installation of the National Carbon Company's new plant at Madras with an annual capacity of 25 million cells raised the capacity of the industry to 217·0 million cells per year. Further, a new unit with an annual rated capacity of 7·5 million cells established by the Flash Lights (India) at Kalyani went into production towards the middle of 1955. Thus the present total annual rated capacity of the five units manufacturing dry cells stands at 224·5 millions. The region-wise break-up of the capacity of the industry is given below:—

Region	Number of units	Capacity (million cells)
1. Bombay	2	52·0
2. West Bengal	2	147·5
3. Madras	1	25·0
TOTAL	5	224·5

The National Carbon Company, utilising a part of the capacity of their plant at Calcutta, have started since 1953 the manufacture of layer-built batteries called 'Minimax' batteries to meet the requirements of the Defence Department and the radio trade. The Solar Batteries also started experimentation in the production of layer-built batteries, but due to financial difficulties they have had to suspend production since 1954. The Estrella Batteries have undertaken the manufacture of inert cells and considerable progress is being made.

The actual production of dry cells in India during the last six years is shown below:—

Year	Production (million numbers)
1950-51	136·5
1951-52	146·0
1952-53	125·0
1953-54	153·0
1954-55	148·4
1955-56	161·1

The somewhat erratic trend of production in the past may be attributed to the stoppage of production of one of the units and the irregular nature of output of others. The actual production of 161·1 million cells in 1955-56 is only about 50 per cent of the target visualised for the same year in the Plan. This low production is mainly due to the fact that demand has not increased to the extent expected.

Imports and exports.—Since 1947, imports of flash light batteries or dry batteries of other popular types have been completely banned. According to the current policy, imports of special types of batteries such as those for hearing-aids are under O. G. L. up to September 30, 1956. Other types of accumulators and batteries are also allowed to be imported on a quota system of 50 per cent of half of the best year's imports.

Statistics of the value of imports of dry batteries for the last five years as published in the Foreign Trade and Navigation Accounts of India are given below:—

Year	Imports (Rs. lakhs)
1950-51	17·0
1951-52	24·3
1952-53	16·8
1953-54	15·3
1954-55	25·8
1955-56 (Ten months, April-January)	56·6

The industry has developed an export market in countries like Burma, Ceylon, Pakistan, Zanzibar, Turkey, Egypt and some other Middle East countries. Such exports are not recorded separately in the Foreign Trade and Navigation Accounts of India. According to the Tariff Commission's Report (1953), exports of dry batteries by indigenous manufacturers during the period, 1950-52 were as follows:—

	Quantity (numbers)	Value (Rs. lakhs)
1950	85,193	0·2
1951	1,445,676	2·6
1952	1,114,966	2·9

The Plan laid down an export target of 20 million dry cells by 1955-56, compared to which the achievement is almost negligible.

Consumption.—The actual consumption of dry cells in 1950-51 was of the order of 147·5 millions. The demand was estimated to increase to 320 millions by 1955-56 on the basis of the increased offtake expected from the radio receiver industry, Defence Department, etc. The break-up of this demand by 1955-56 as anticipated is shown below:—

	(Million cells)
Flash light batteries	175
Defence	25
Radios	100
Export	20
TOTAL	320

On the basis of the production in 1955-56 and also taking into account the exports and imports of dry batteries, the current consumption may roughly be estimated at 160 million cells per annum, An approximate break-up of consumption in different sectors is indicated below:—

	(Million cells)
Batteries for flash lights	120
Radios	*25
Defence	15
TOTAL	160

* Based on the number of dry cell operated radio receivers estimated at 2·5 lakhs *i. e.* 25 per cent of the total number of radio licences in 1955-56.

Thus the actual consumption of dry cells at the present time is much less than was expected. This is partly accounted for by the short fall in demand for dry cells for the radio trade.

Capital and labour.—The total amount of paid-up capital of the industry is about Rs. 94·7 lakhs. The total labour employed is 2,658.

Tariff protection.—The claim of the dry battery industry to protection was first examined by the Tariff Board in 1947. On the recommendation of the Board, protection was granted by converting the then existing revenue duty of 30 per cent *ad valorem* into a protective duty at the same rate. Protection was granted only up to March 31, 1949, but it was subsequently extended in consultation with the Tariff Board to March 31, 1950. In 1950, the Tariff Board conducted another inquiry into the industry and on their recommendation, protection was continued up to December 31, 1952, and further extended up to December 1953. On the expiry of this period, the Tariff Commission again enquired into the case for the continuance of protection to the industry and recommended that since the industry was not exposed to any threat of foreign competition, the protection granted might be discontinued from January 1954. The Government accepted the recommendation of the Tariff Commission and protection has been withdrawn since January 1954.

Raw materials.—The industry is dependent to a considerable extent on imported raw materials; about 78 per cent of the total value of raw materials required for the industry is accounted for by imports. Attempts are, however, being made to lessen this undue dependence on imported raw materials and improve the ratio of the indigenous content in the final product. The Council of Scientific and Industrial Research have arranged a joint programme of work between the Geological Survey of India and the National Chemical Laboratory for developing indigenous sources of manganese dioxide. Experimentation is going on in three National Laboratories and considerable progress is reported to have been made in this line. Besides, the National Carbon Company, one of the dry cells manufacturing units in the country, have independently carried out investigations and tests on manganese ores from different regions in the country. They have got a complete plant for crushing manganese ore, which they are at present importing in substantial quantities since sufficient supplies of battery grade ore are not available from domestic sources. This firm has started manufacture of a sealing compound from indigenous raw materials (rosin, lamp black, silica sand, etc.). In the case of zinc chloride, ammonium chloride and single faced corrugated boards, the industry is meeting its entire requirements from local sources. Corn starch is also now available from indigenous sources. Other indigenous raw materials used by the industry are kraft paper, gummed paper tapes, dextrin, connecting wires and cables, asphalt and packing materials.

II. Programme of Development in the Second Plan

Estimated requirements.—The bulk of the demand for dry cells is for flash lights and it is difficult to estimate accurately what the future demand for these will be. With the increased installation in the villages of dry battery operated community receivers, the demand for dry batteries for radios will increase considerably. Taking these facts into consideration, the Development Council for Light Electrical Industries have estimated that the demand for dry batteries by 1960-61 will be of the order of 225 million cells.

Targets of capacity and production.—As the requirements of dry cells by 1960-61 are estimated at 225 millions, production on the same scale is envisaged by that date. The present capacity is sufficient to meet the estimated requirements by 1960-61. It does not, therefore, seem necessary to create any additional capacity during the Second Plan period. In case the demand increases beyond the estimate given above, production can be stepped up by operating the available plants on more than one shift or by expanding existing plants.

Raw materials.—The approximate quantity and value of some of the important raw materials required for a production of 225 million cells per year are as given below:—

Raw materials	Quantity		Value (Rs. lakhs)
1. Zinc strips/slabs	3,500	Tons	70·0
2. Brass strips, contacts, caps, etc.	85	„	3·5
3. Solder (tin and lead)	120	„	6·5
4. Manganese ore and activated manganese dioxide	5,500	„	20·0
5. Ammonium chloride	1,700	„	7·5
6. Acetylene black	600	„	20·0
7. Carbon electrodes	180	Million numbers	18·0
8. Special types of electrodes for layer-built H. T. batteries	40	„	15·0
9. Zinc chloride	420	Tons	6·0
10. Corn starch	280	„	2·3
11. Synthetic resins, adhesives, solvents, etc.	1,500	„	40·0
12. Paper and paper-board, corrugated boards and cartons, printed labels and boards etc.	75	„	4·5
13. Miscellaneous chemicals and materials such as asphalt, rosin, paraffin wax, silica sand, lamp black, dextrin, gums, etc.	1,500	„	9·0
14. Graphite	75	„	1·0
15. Packing materials, wooden cases, etc.	..		10·0
	TOTAL		233·3

Some schemes have already been undertaken for the indigenous manufacture of certain important raw materials required for the industry. The National Carbon Company were licensed in 1954 to expand their undertaking by setting up a rolling mill for the manufacture of 2,000 tons of zinc strips per annum on a single 8-hour shift. Considerable progress is being made by the firm in the implementation of this scheme. This expansion scheme involving an outlay of about Rs. 18 lakhs is, in fact, a carry-over from the First to the Second Plan.

The following table summarises the programme of development of the industry during the Second Plan period.

	1955-56	1960-61
Number of units	5	5
Capacity (Million cells)	224·5	224·5
Production (Million cells)	161·1	225·0

21. STORAGE BATTERIES

I. Review of Progress in the First Plan

Targets.—The rated capacity of the industry was expected to increase to 538,420 storage batteries by the end of the First Plan as against a capacity of 445,820 in 1950-51, and the production to 400,000 as against 200,000. Consumption was expected to rise to a level of 400,000 storage batteries by 1955-56 as compared to 250,000 at the beginning of the Plan period and to be met entirely from indigenous production.

Capacity and production.—At the commencement of the First Plan, there were 13 units in production, whose annual rated capacity was estimated at 445,820 batteries per annum on a single shift basis. In 1951 five more units (*viz.* the Free India Dry Accumulators, Calcutta, the Mysore Electro Chemical Works, Bangalore, the Oldham and Sons, Madras, the Kolhapur Auto Works, Kolhapur and the Modern Battery Manufacturing Co., Bombay), went into production with a combined installed capacity of 89,000 batteries per annum.

In 1952 one more unit (*viz.* the Acme Batteries, Delhi—Shahdara) undertook the production of Motor vehicle batteries with a capacity of 3,600 batteries per annum. From March 1954, the General Motors (India) who were one of the leading producers went out of production. In the year 1955 two units, *viz.*, the Associated Battery Makers (Eastern) and the Standard Batteries, Bombay, increased their capacity by 6,000 and 10,000 batteries per annum respectively.

In addition to these manufacturing units, there are a large number of assemblers who purchase their requirements of plates from regular manufacturers.

While the capacity of the industry might thus seem to be of the order of 500,000 batteries on the basis of the estimate of the Tariff Commission (1951) and subsequent progress, it was, according to a more recent study of the subject by the same body, only 329,000 batteries per annum in 1955.

In making the assessment the Tariff Commission took into account 20 manufacturers distributed in West Bengal (8), Bombay (8), Mysore (2), Madras (1) and Delhi (1). Of these only 13 units are registered with the Development Wing of the Ministry of Commerce and Industry (D. W. C. I.) and the capacity of 290,100 as assessed by the D. W. C. I. is taken as the capacity of the organised units at the commencement of the Second Plan.

It is doubtful whether any of these estimates can be considered to be an accurate assessment of the present capacity of the industry. Unless a technical survey of the units is conducted, it is difficult to arrive at any exact or correct idea of the present capacity.

The regional distribution of the 13 units on the active list of the Development Wing is as follows:—

State	Number of units	Rated capacity.
		(Numbers)
1. West Bengal	6	160,000
2. Bombay	3	93,000
3. Mysore	2	18,500
4. Madras	1	15,000
5. Delhi	1	3,600
TOTAL	13	290,100

The production of the organised sector of the industry *viz.* the units on the active list of D.W.C.I. has been as follows:—

Year	Production (Numbers)
1951-52	212,836
1952-53	136,000
1953-54	179,000
1954-55	210,100
1955-56	258,086

There was a sudden fall of production in the year 1952-53 which was connected with the general slump in the automobile industry. Since then, production has risen steadily and the present rate of output is nearly equal to 90 per cent of capacity.

There is a considerable volume of production in unregistered small-scale units which assemble or recondition batteries from purchased components. No accurate statistics are available for this section of the industry.

Imports and exports.—The import of batteries (light duty type) for motor trucks and cars has been totally banned from July 1, 1952. The established importers of heavy duty batteries were granted a quota of 100 per cent of one half of their best year's imports during the period, July-December 1952. The same quota was allowed for the next licensing period, January-June 1953, but a condition was laid down that licences were not valid for batteries below 250 A. H. and 150 A. H. at 10 hours rate in the 6 volts and 12 volts categories respectively. The quota was reduced to 50 per cent for all the succeeding licensing periods, *viz.* July-December 1953, to July-December 1955, and the conditions laid down in the preceding period continued to operate. The same policy is being continued for the present.

Imports of storage batteries are not separately recorded by numbers and value in the Foreign Trade and Navigation Accounts of India. Data relating to numbers and value of imports given by the Tariff Commission in their report of 1955 are as follows:—

Year	Quantity (Numbers)	Value (Rs.)
1950	4,969	2,85,325
1951	17,173	5,00,364
1952	6,867	6,62,596
1953	4,199	54,045
1954	5,838	1,94,143
1955 (January-April)	571	19,769

With effect from October 25, 1952, exports of storage batteries have been placed under open general licence but figures of exports are not recorded separately. The Electrical Storage Co., Calcutta, claim to have exported 66 batteries during 1951-52 and 1,025 in 1952-53 to some of the neighbouring countries. But the efforts to export batteries have not met with any significant success.

Competition in the markets of some of the neighbouring countries such as Ceylon, Indonesia and Burma was especially keen from Japanese batteries. There is scope for expansion of exports of motor batteries within the Asia-African region.

Consumption.—The Tariff Commission (1952) had estimated the total demand for motor vehicle batteries in the country at about 340,000 in 1952, which was expected to increase to about 360,000 during the next three years. This estimate of demand included replacement batteries required for motor vehicles of different types then on the road and batteries for new vehicles, radios, telegraphs and telephones. The Tariff Commission (1955) has estimated the demand for batteries on the basis of there being 353,000 motor vehicles on the road during the last quarter of 1953-54. On the assumption that the life of a battery is 18 months for motor cars, and 12 months for buses, motor cycles, trucks and miscellaneous vehicles, the total demand for batteries comes to 295,000. Adding to it the demand for batteries for new vehicles, radios and other purposes, estimated at 45,000 the current demand has again been put at 340,000 batteries per annum *viz.*, the same figure as in 1952. The total numbers actually available for consumption from imports and the indigenous production of the organised sector (exports being negligible) have been as follows:—

Year	Production (Numbers)	*Imports (Numbers)	Quantity available for consumption (Numbers)
1950-51	194,013	4,969	198,982
1951-52	212,836	17,173	230,009
1952-53	136,000	6,867	142,867
1953-54	179,000	4,199	183,199
1954-55	210,100	5,838	215,938
1955-56	258,086	1,713 (Estimated)	259,799

* **Figures relate to calendar years.**

The above production figures relate to the organised sector only. The unorganised sector is estimated to produce about 75,000 batteries per year which are also available for consumption.

Diversification of production and progress on ancillary recommendations.—Since the installed capacity of the industry was deemed to be more than sufficient to meet the demand anticipated by 1955-56, the establishment of new units during the period of the Plan was not considered necessary. It was, however, recommended that the battery industry should diversify its production.

Considerable progress has been made in respect of diversification of production, and several new types of batteries such as motor cycles batteries and heavy duty batteries required for use in omnibuses, heavy trucks, electrically driven equipment, marine engines, aircraft, tractors and tanks are now being manufactured in the country.

The Free India Dry Accumulators have started production of 'dry type' accumulators and the Oldham and Sons have taken up the production of heavy duty traction batteries. Seven firms are now engaged in the manufacture of heavy duty batteries required for various types of buses and trucks. The production of train lighting batteries was 810 cells in 1951, 1,923 in 1952, 5,060 in 1953, 9,058 in 1954 and 3,485 during January-June 1955.

Two of the principal producers of motor vehicle batteries, *viz.*, the Associated Battery Makers, Calcutta, and the Standard Batteries, Bombay, have installed the necessary equipment for refining scrap lead. The former plant has recently gone into production.

As regards the reclamation of rubber, the Bharat Battery Manufacturing Co., Calcutta have been granted an import licence by the Government for the necessary machinery and equipment and they expect to commence operations by the middle of 1956.

Separators for batteries.—The manufacture of separators has been undertaken recently in the country with up-to-date equipment. Wooden separators of indigenous manufacture have been largely used by the industry, and imports have been allowed only when indigenous separators have not been available. Indigenous production for the last four years was as follows:—

Year	Production (Million pieces)
1952	2·3
1953	3·9
1954	8·5
1955 (January-June)	4·5

The figures indicate a steady increase in production. The Leela Separators Manufacturing Co. is one of the big suppliers and they produce about 3·5 million pieces per annum. This unit is taking steps to increase its production to 5 million pieces per annum. There has been a trend towards the use of imported separators other than those made of wood, such as those made of glass wool, microporous plastic material and microporous rubber. The Standard Batteries are establishing their own plant for making microporous rubber separators. According to the Development Wing of the Ministry of Commerce and Industry, there has been constant improvement in the quality of wooden separators. Standard specifications for separators have been finalised by the Indian Standards Institution (ISI).

Containers for batteries.—Some of the large battery manufacturers have put up equipment for the manufacture of their own containers. Containers are being produced by the Firestone Tyre and Rubber Company and also by three units in the industry *viz.*, the Standard Batteries, the Associated Battery Makers and the Bharat Battery Manufacturing Co., Calcutta. The total capacity of these four units is estimated at about four lakh containers per annum. While three of these firms are using vulcanised rubber for manufacturing containers, the fourth uses asbestos after suitable processing.

Quality of batteries.—The quality of indigenous storage batteries is satisfactory and there has been satisfactory improvement year by year. The organised sector of the industry has claimed that it is producing batteries according to the specifications formulated by the ISI for light duty batteries. The formulation of standards for heavy duty batteries is under the active consideration of the ISI.

Capital and labour.—Figures of the capital invested are not available for all the factories. The total number of workers employed by the industry is estimated at about 1,700.

Development Council.—The Government of India constituted a Development Council for Light Electrical Industries in early 1955, under the Industries (Development and Regulation) Act, 1951. The Council includes within its purview the storage batteries industry.

Tariff protection.—The industry has enjoyed tariff protection for about 7 years. The first inquiry was held in March 1947 and protection was granted to the industry in November 1948, and up to March 1950. Protection was extended from time to time till the end of 1955. It has finally been withdrawn as a result of the Tariff Commission inquiry of 1955.

Problems of the industry.—The most important problem of the industry is that of raw materials. At the commencement of the First Plan the industry was entirely dependent on imports for the supply of its most essential raw materials. This was responsible for the high cost of production. During the period of the Plan the production of separators has increased considerably and dependence on foreign imports has been correspondingly reduced. The refining of scrap lead has been taken up recently. But this has to be largely supplemented by imports of lead from Australia and Burma. Lead oxide is manufactured in the country from imported lead and its quality is suitable for the industry. Though antimony is produced indigenously, the ore for its manufacture has to be imported since the Chitral deposits have fallen to Pakistan.

II. Programme of Development in the Second Plan.

Estimated requirements.—As already stated, the Tariff Commission in 1955 has estimated the present requirements of storage batteries at 340,000. Increase in the demand for storage batteries in the next few years will be determined mainly by the number of new motor vehicles put on the road and the extent to which there is a wider use of radio batteries. Having regard to these factors the Tariff Commission considered that the demand for batteries would increase by about 20,000 every year during the next three years. The Development Council for Light Electrical Industries has suggested the following targets:—

Motor vehicle batteries	420,000	numbers
Train lighting batteries	7,000 or 84,000	sets of 24 Volts cells of 2 Volts
Train lighting batteries (Alkali type)	700	sets

Targets of capacity and production.—In the light of the estimated demand of 420,000 batteries per annum it is considered that the targets for capacity and production in the organised sector should be 350,000 batteries per annum. A further 70,000 batteries per annum are expected to be produced by the small-scale units engaged in assembling and repairing. Thus the overall production target for 1960-61 is envisaged at 420,000 batteries.

Schemes licensed and under implementation.—In order to attain a target of 350,000 batteries per annum in the organised sector, an additional capacity of 74,400 batteries per annum has already been sanctioned. The new schemes sanctioned are as follows:—

Name of the firm	*Location*	*Additional annual capacity* (Numbers)	
1. Automobile Batteries and Cable Mfg. Co. (New unit)	Ulhasnagar, Bombay.	Automobile batteries	8,400
2. Amco Batteries (Expansion)	Bangalore.	(i) Motor vehicle batteries "Oakes Brand"	60,000
		(ii) Heavy duty batteries.	6,000

Additional capacity required.—With the implementation of these schemes the capacity of the units registered with the Development Wing will increase to 364,500 batteries per annum. It does not, therefore, seem necessary to license any more capacity in the organised sector.

Requirements of raw materials.—The industry will continue to depend on imports for some of its raw materials particularly rubber separators and sulphur. Lead, alkali-reclaimed rubber and other chemicals will be available from indigenous sources. Wooden separators are available in sufficient quantities to meet the full requirements of the industry.

The average annual requirements of the principal raw materials for producing 420,000 batteries are as follows:—

Lead	6,500	tons
Antimony	460	"
Lead oxide	1,000	"
Alkali-reclaimed rubber	1,280	"
Rubber components for containers and plugs	100	"
Sulphur	230	"
Wooden separators	20	million numbers
Other types of separators	16	"

The following table summarises the programme of development of the storage battery industry during the Second Plan:—

	1955-56 (Numbers)	1960-61 (Numbers)
Organised sector		
Capacity	290,100	350,000
Production	258,086	350,000
Decentralised sector		
Capacity	N.A.	N. A.
Production	N. A.	70,000

22. RADIO RECEIVERS

I. Review of Progress in the First Plan.

Targets.—At the beginning of the First Plan the capacity of the organised sector of the industry was assessed at 77,200 sets per year. Taking into account the capacity of the 5 new units being established at that time and the additional capacity envisaged as normal development by certain others, it was estimated that an annual installed capacity of 380,000 would be attained by 1955-56.

The demand for radio receivers was estimated to reach a figure of 350,000 per annum by the end of 1955-56 and a production target of the same order was envisaged by the end of the period of the First Plan.

Capacity and production.—In 1950-51 there were 11 units engaged in assembling radio sets on the active list of the Development Wing of the Ministry of Commerce and Industry and, as already stated, their capacity was assessed at 77,200 numbers per year. There were at that time five new units being established. All of these went into production before June 1952, while one unit stopped production. Thus by June 1952, there were 15 organised units with an annual rated capacity of 153,000 sets on a single shift basis. Since then a new unit *viz.* the Flashlights (India), Calcutta, which was granted a licence in 1954, has started production. Its capacity is assessed at 6,000 sets per annum. Another firm, the Western Agencies, Bombay, who were granted a licence for carrying on business under the Industries (Development and Regulation) Act was also added on to the list of approved manufacturers. This firm has an annual capacity of 6,000 radios. On the other hand, the Tesla (India) Radio Manufacturing Co., Bombay, is reported to have ceased production. Thus there are at present 16 firms on the active list of the Development Wing of the Ministry of Commerce and Industry, of which one unit in PEPSU has been out of production since 1955. The Development Wing have carried out a detailed technical survey of the factories of the existing radio manufacturers in the organised sector recently and assessed the installed capacity of the 15 units in production at 213,000 radios per annum. The manufacturers themselves claim a capacity of 274,200 sets per year. The State-wise distribution of the radio industry in the organised sector is given below:—

State	Number of units	Annual rated capacity on single shift basis (Numbers)
Bombay	4	84,000
Bihar	1	12,000
Delhi	1	6,000
Madras	1	3,000
Mysore	1	18,000
Punjab	2	12,000
West Bengal	5	78,000
TOTAL	15*	213,000

* This is exclusive of a unit in PEPSU which has been out of production since 1955.

In addition to the organised units, there are a large number of unregistered firms and technicians who assemble radio sets. Though exact data regarding their output are not available, they are believed to be producing about 20,000 to 25,000 sets per annum. A recent survey by the Development Commissioner for Small-Scale Industries has placed the output of the decentralised sector at 30,000 radio sets per annum.

Production of radio receivers by the organised sector has been as under during the last six years as against a target of 350,000 by 1955-56 set in the First Plan:—

Year	Production (Numbers)
1950-51	49,100
1951-52	89,600
1952-53	68,900
1953-54	57,000
1954-55	57,100
1955-56	102,000

It will be seen that the target has nowhere been reached and that, though production has increased somewhat over the level of 1950-51, it has fluctuated considerably. The industry experienced a marked setback after 1951-52 due to the general recession in trade. But there has been a distinct recovery in production in the last year of the Plan.

Imports and exports.—Control is being exercised over the import of radio sets. The import policy for January-June, 1956 for wireless instruments and apparatus, including wireless transmission apparatus, permits established importers 7 per cent of one half of the best year's imports from soft currency areas, subject to the condition that licences will be valid only for the import of radio sets of 9 valves and above, radio-grams, communication type receivers and car radio receivers.

Imports of radios and parts during the last six years have been as follows:—

Year	Radio receivers (complete)		Radio valves		Components other than valves (Rs. lakhs)	Others (Rs. lakhs)	Total value (Rs. lakhs)
	(Numbers)	(Rs. lakhs)	(Numbers)	(Rs. lakhs)			
1	2	3	4	5	6	7	8
1950-51	16,137	25·7	542,923	13·7	72·7	25·8	1,37·9
1951-52	29,121	52·6	801,583	22·6	1,16·6	15·0	2,06·8
1952-53	19,286	36·1	567,825	16·3	80·7	16·8	1,49·9
1953-54	13,042	23·5	437,506	11·0	46·7	37·2	1,18·4
1954-55	4,515	11·2	635,504	14·7	63·7	32·2	1,21·8
1955-56	6,258	17·6	1,407,918	30·1	109·0	52·0	208·7

There are no exports of radio receivers at present. Draft rules called the Custom Duties Drawback (Radio Receivers) Rules, 1954, have been published. According to these rules the rate of drawback of duty will be seven-eighths of the average amount of duty paid on raw materials used in the assembly of radio sets to be exported. This will, it is hoped, help the manufacturers to reduce the cost of production and facilitate the development of an export market for radio receivers.

Consumption.—The demand for radio sets depends upon several factors such as the cost of the sets, the availability of electric power and the quality of the broadcasting programmes. The Planning Commission at the time of formulating the development programme for the radio receivers industry under the First Plan felt that the total number of licences for radio sets would increase from 507,324 in December 1950 to about 1·125 million by 1955-56 on the basis of the then rate of increase; but taking into consideration such factors as the extension of broadcasting services to Part 'B' States and to the rural areas and the availability of cheap radio sets and electric power, they estimated that the total number of licences might increase to 1·8 million by 1955-56. The annual rate of increase was expected to be slow during the first two or three years but subsequently to rise more rapidly so as to reach a figure of about 350,000 per annum by 1955-56.

In actual fact the number of licences for radio sets which stood at 507,324 in December 1950 increased to only 1,187, 563 according to the latest figure available, representing an average annual increase of about 136,000 sets during the Plan period.

It will be seen that expectations with regard to the increase in the number of licences for radio sets have not been realised. It is argued by some of the manufacturers that this is due in some measure to the restrictions placed on the broadcast of light music from the All-India Radio which makes its programmes uninteresting to the general public and results in low offtake of radios.

The actual number of radio sets available for sale during the last six years based on actual production from the organised sector plus imports has been as under:—

Year	Production (Numbers)	Imports (Numbers)	Actual quantity available for consumption (Numbers)
1950-51	49,100	16,140	65,240
1951-52	89,600	29,120	118,720
1952-53	68,900	19,290	88,190
1953-54	57,000	13,050	70,050
1954-55	57,100	4,520	61,620
1955-56	102,000	6,300	108,300

On the basis of the production data for 1955-56 in respect of the organised sector and the latest estimate of the Development Commissioner regarding the estimated output of the decentralised sector, the offtake inclusive of imports may be placed at about 140,000 radios in the last year of the Plan.

Capital and labour.—The capital invested in the 15 organised units manufacturing radio receivers cannot be given separately for this industry as some of the units are also manufacturing other items besides radio sets. The number of persons employed in these units is estimated to be 2,000 to 2,500.

Problems of the industry.—There was a slump in the industry after 1952 as will be seen from production figures given above; indeed throughout the last six years, the production of radio receivers has been considerably below capacity. This is due to lack of demand for radio sets. In existing conditions expansion of production is linked with the production of cheap radio receivers within the reach of the average man. It is difficult to bring down the prices of radio sets unless they are produced in large numbers and the required components are available cheaply. A good number of required components are at present imported and have to bear high import duties. The large amount of working finance required in this industry is also a second problem facing the manufacturers.

Action on main recommendations.—(i) It was recommended in the Plan that with a view to reducing the cost of parts which cannot be economically produced in the country, the question of reducing import duty on components and raw materials should be examined. During the last two years, however, the manufacturers of radio receivers have shown considerable interest in taking up the manufacture of essential components such as condensers, loud-speakers, etc., and so a reduction in the import duty on components at the present stage is likely to retard the progress of the components industry in India and does not, therefore, appear to be advisable.

(ii) It was also recommended that licensing of radio assembling should be introduced in the country and radio sets produced should be in accordance with the standards formulated by the Indian Standards Institution. The radio receivers industry is one of the scheduled industries under the Industries (Development and Regulation) Act, 1951, and all cases of expansions or setting up of new units must come before the Licensing Committee. The formulation of standards for radio receivers and components is in progress under a Technical Committee of the Indian Standards Institution. Eight standards concerning various aspects of radio receivers and components have been published. A few more standards are at various stages of formulation.

Development Council.—A Development Council was set up for Light Electrical Industries early in 1955 under the Industries (Development and Regulation) Act. This Council includes the radio receivers industry also in its programme of work.

II. Programme of Development in the Second Plan.

Estimated requirements.—The present domestic demand for radio sets is estimated to be of the order of 140,000 numbers per year as stated earlier. It is somewhat difficult to anticipate the likely increase in demand during the period of the Second Plan. Taking into consideration the fact that a number of new broadcasting stations have been opened and the power of the existing ones increased so as to serve larger areas and also the fact that about 72,000 additional community receivers are expected to be in use over the period of the Second Plan, it may be reasonable to estimate that the overall demand for radio receivers inclusive of exports, may be of the order of 200,000 to 225,000 per year by 1960-61. In view of the difficulty in accurately estimating requirements, the current assessment should be reviewed by the end of 1957.

Schemes licensed and under implementation.—Licences have been granted for the manufacture of radio components and ancillary or related items to the following firms, details of which are given below:—

Name of the firm and location 1	Item to be manufactured 2	Annual capacity (Numbers) 3
1. Radio and Electricals Mfg. Co., Bangalore (Expansion) .	(i) All types of loud-speakers including electrical type	To be increased from 12,000 to 30,000
	(ii) All types of gang condensers	30,000
	(iii) Band switches	30,000
	(iv) Volume controls & tone controls (potentiometers).	60,000
	(v) a. Paper capacitors. b. Mica capacitors. c. Electrolytic capacitors.	1,002,000
	(vi) Valve holders	150,000
	(vii) Trimmers	210,000

1	2	3
2. Man Radio and Electrical, Faridabad (new unit) . .	(i) Transitors	240,000
	(ii) Diodes	480,000
3. Western Agencies, Bombay . . . . . . [For carrying on business under the Industries (Development & Regulation) Act and also expansion]	(i) Transformer chokes	To be increased from 6,000 to 24,000
	(ii) Dials for radios	To be increased from 24,000 to 120,000
	(iii) Loud-speakers	24,000
	(iv) Wave band switches	12,000
	(v) Inter-office equipment	240
	(vi) Cabinets	To be increased from 4,800 to 24,000
4. Telcom Industries, Bombay . . . . [For carrying on business under the Industries (Development & Regulation) Act.]	(i) Radio cabinets	8,000
	(ii) Radio dials	60,000
5. G.B. Dere (Rescon Manufacturing Co.,) Poona (new unit)	(i) Carbon resisters	3 million
	(ii) Carbon potentiometers	192,000
	(iii) Condensers	1·98 million

The factory of the Bharat Electronics which is being established by the Ministry of Defence at Jalahalli, for the manufacture of electronic equipment in technical collaboration with the French firm, *Compagnie General Telegraphie Sans Fil*, is expected to go into production during 1956. The factory proposes to produce all wireless, radio and electronic equipment, particularly electronic valves of all types required in the manufacture of radio equipment. The production programme for 1956-57 has been finalised and the approximate value of the output will be Rs. 50 lakhs. When the factory reaches full production, which is expected by 1958-59, it is estimated that the annual turnover will be about Rs. 4·4 crores.

Targets of capacity and production.—Since the demand for radio sets is estimated to be of the order of 200,000 to 225,000 per year by 1960-61, production of the same order is envisaged by that date. The annual rated capacity of the organised units engaged in the assembly of radio sets is 213,000 per year. The capacity claimed by the manufacturers is 274,200 per year. It is considered that this capacity is adequate and that there is no need to establish any new units in the organised sector for the manufacture of radio receivers. Expansion of the existing uneconomic units to economic sizes may, however, have to be considered. There may be also some room for expansion of the industry in the small-scale sector since it will assist in providing employment to educated unemployed persons. This matter is receiving the attention of the Small-Scale Industries Board.

At present a good number of components required by the industry are being imported. But as stated earlier, a number of schemes for the manufacture of components and parts including that of the Bharat Electronics for valves, have been approved and it is, therefore, expected that with the implementation of these schemes most of the components will be available from indigenous sources by 1960-61.

The following table summarises the development of the radio receivers industry envisaged during the period of the Second Plan.

	1955-56	1960-61
Annual capacity (Numbers) (Organised sector)	213,000	213,000
Production (Numbers) (Including decentralised sector)	132,000	200,000 to 225,000

D. Chemical and Allied Industries

23. FERTILIZERS

The fertilizer industry is dealt with in three sections covering nitrogenous, phosphatic and potassic fertilizers.

A. Nitrogenous Fertilizers

I. Review of Progress in the First Plan

Targets.--The First Plan envisaged the expansion of capacity for nitrogenous fertilizers from 78,670 tons (15,734 tons of fixed nitrogen) in 1950-51 to 481,270 tons (96,254 tons of nitrogen) in terms of ammonium sulphate by 1955-56 and of production from 46,304 tons to 450,000 tons. These developments were expected to be brought about mainly through (a) completion of the Sindri Fertilizer Factory of the Central Government, (b) expansion of the Mysore Chemicals and Fertilizers from 6,600 to 13,200 tons capacity and (c) expansion of the Fertilizers and Chemicals (Travancore) (FACT) from 46,000 to 92,000 tons capacity in terms of ammonium sulphate.

Capacity and production.—The Sindri Fertilizer Factory went into production in November 1951 and has by now attained a daily production capacity of 960 tons of ammonium sulphate. The production of this factory and the combined production of all the units during the period of the Plan are shown below:—

	Production of Sindri (Tons)	Total production (Tons)
1951-52	34,800	95,000
1952-53	219,000	252,000
1953-54	249,000	307,000
1954-55	298,300	365,000
1955-56	326,000	380,000

The shortfall in production is due to the non-expansion of capacity of plants as envisaged under the First Plan, which is discussed below.

Progress of developments at the Sindri Fertilizer Factory.—The Sindri Fertilizer Factory has started production of the iron oxide catalyst required in the water gas shift reaction for the generation of hydrogen needed for ammonia synthesis. This has eliminated dependence on imports for an important item of stores. With rising production at this factory the selling price of ammonium sulphate to the fertilizer pool was brought down from Rs. 350 in 1952 to Rs. 270 per ton in 1955.

Another development at Sindri during this period has been the construction of a coke-oven battery with a daily capacity of 600 tons and equipped with an up-to-date recovery system for the by-products from the coke-oven gas. This development was undertaken to enable the factory to obtain its own supplies of coke which, in the early years, were obtained from the Indian Iron and Steel Company and the merchant cokeries. The coke-oven plant costing Rs. 2·81 crores went into operation on September 1, 1954.

Anticipating a rise in the consumption of nitrogenous fertilizers, the Government appointed a team of technical experts with the aid of the Technical Co-operation Administration of the U.S.A. (TCA) to examine the possibilities of stepping up fertilizer production at Sindri on the basis of the coke-oven gases expected to be available at the rate of 10·0 million cu.ft. per day as a by-product from the coke-ovens. The technical team visited the fertilizer factories manufacturing ammonium nitrate, urea and other fertilizers in the course of a tour of Japan, the United States and Europe and recommended to the Central Government the desirability of producing ammonia by reforming coke-oven gas and further converting it to sulphate-nitrate and urea. The recommendations of the technical experts were accepted by the Government. Tenders for the Sindri expansion were called for in 1954-55 and thereafter the contract for the construction of the plants was given to Messrs. Montecatini of Italy. The cost of the project is estimated at about Rs. 11 crores, of which an expenditure of about Rs. 2·58 crores had been incurred before the end of the First Plan.

Progress on the expansion of FACT.—The construction of a plant for the production of 8,000 tons of ammonium chloride per annum was completed by FACT by the end of 1954. But progress on the doubling of their capacity was considerably delayed because preliminary studies were needed in order to decide the types of nitrogenous fertilizers to be produced and the processes to be adopted with a view to improving the economics of the plant. A Technical Committee appointed by the Government reported on the expansion scheme in 1954-55. The principal suggestions were:—

(a) A part of the output amounting to about 18,000 tons should be produced in the form of ammonium phosphate (N 16 per cent and P_2O_5 20 per cent);

(b) The production of ammonium sulphate should be expanded from 48,000 to 60,000 tons; and

(c) While in the first instance only the hydrogen required for the expanded production of ammonia need be produced electrolytically, the entire requirements should before the end of the Second Plan be obtained by this process with a view to reducing the the cost of production.

The capital cost of the expansion scheme was estimated by the Technical Committee at Rs. 2·54 crores. The scheme was scrutinised and approved for implementation by the Central Government. A loan from the Industrial Finance Corporation of India at 4½ per cent has been arranged for financing the expenditure during the Second Plan.

Progress on the expansion project of the Mysore Chemicals and Fertilizers.—Not much progress has been made on this scheme. During 1953-54, the Company erected the ammonia compressor and circulator and the Industrial Finance Corporation of India was approached for financial assistance for the completion of the scheme.

Imports.—Substantial quantities of nitrogenous fertilizers were imported directly and under the TCA programme during the First Plan. The imports included some quantities of alternative fertilizers which are now programmed for production under the Second Plan like ammonium nitrate, urea and sulphate-nitrate, with a view to testing them more fully in their application to Indian soils and popularising their use. The imports of ammonium sulphate have been as under:—

	Quantity (Tons)	Value (Rs. lakhs)
1951-52	67,380	2,45·27
1952-53	19,948	85·46
1953-54	69,525	2,13·12
1954-55	83	0·29
1955-56 (April–January)	7,835	55·12

Consumption.—The consumption of ammonium sulphate which was about 275,000 tons in 1950 showed a steady expansion and reached 420,000 tons in 1953 and is estimated to have risen to about 610,000 tons in 1955-56 as a result of the following factors:—

(a) Reduction in the issue price of ammonium sulphate from Rs. 330 to Rs. 290 per ton;

(b) Introduction of uniform freight rate as a result of which ammonium sulphate is available at Rs. 315 per ton at any rail-head in the country;

(c) Reduction in the distribution charges and the availability of the fertilizer at Rs. 345 per ton at the farmer's door;

(d) Grant of credit facilities to the farmers for purchase of fertilizers on a substantial scale;

(e) Effective demonstrations and publicity carried out by the staff of the Agricultural Departments and by the National Extension Service; and

(f) Extensive adoption of the Japanese method of cultivation in the country for the rice crop.

Problems of the industry.—The production of ammonium sulphate at FACT's Alwaye plant was considerably below capacity in the first three years of the Plan owing to difficulties in the procurement of sulphur. This had the effect of increasing the cost of production. The high prices ruling for fuel oil also pushed up costs. In consequence, FACT were in difficulties, particularly after the commencement of production by the Sindri Fertilizer Factory on account of the comparatively high price of their product. Government came to the assistance of the Company by taking its output into the fertilizer pool at a price of Rs. 314 per ton compared to Rs. 290 per ton for Sindri's production.

The by-product ammonium sulphate produced by the merchant cokeries and the steel works is allowed to be sold only at a lower price of Rs. 250 per ton so that these producers felt the absence of a price incentive.

Since the fertilizer industry is one of those requiring large-scale transportation facilities, it was at times faced with the problem of shortage of transport and accumulation of stocks with the producers.

II. Programme of Development in the Second Plan

Estimated requirements.—The requirements of fertilizers have to be viewed in relation to the agricultural targets envisaged and the increases in production expected to be obtained from the different contributory factors like irrigation, improved seeds, improved techniques, manures and fertilizers. Under the programmes for agricultural development formulated for the Second Plan, it is visualised that in 1960-61 out of the additional production, which it is planned to achieve, of foodgrains, oilseeds, sugarcane, cotton and jute (as shown below) one quarter is to be secured through increased use of manures and fertilizers.

	Unit	Estimated production	
		1955-56	1960-61
(a) Food grains	Million tons	65·0	75·0
(b) Oilseeds	„	5·5	7·0
(c) Sugarcane (*Gur*)	„	5·5	7·1
(d) Cotton	Million bales	4·2	5·5
(e) Jute	„	4·0	5·0

Another indicator of the greatly increased use of fertilizers which may be expected during the Second Plan is furnished by figures of acreage under irrigation which is expected to rise from 67·0 million acres in 1955-56 to 88·0 million acres in 1960-61. Consumption is also expected to be stimulated by the relatively cheaper prices at which the fertilizers will be available when produced in the form of alternatives to ammonium sulphate. The following table indicates the levels of requirements of nitrogenous fertilizers during the period of the Second Plan according to the estimates worked out by the Ministry of Food and Agriculture:

	Fixed nitrogen (Tons)
1956-57	150,000
1957-58	190,000
1958-59	240,000
1959-60	300,000
1960-61	370,000 (1·6 million tons as ammonium sulphate)

Apart from ammonium sulphate now largely in use in India, the Ministry of Food and Agriculture have accepted nitrolimestone (20·5 per cent nitrogen), sulphate-nitrate (26·5 per cent nitrogen) and urea (44-46 per cent nitrogen) as by and large suitable; but have indicated that their application has to be restricted to certain regions until more experiments have been carried out on the suitability of soils for their application and on methods of improving storage conditions. It is, therefore, necessary to accelerate experimental trials into all aspects of the storage, distribution and application of these alternative fertilizers under different soil conditions and for a wide variety of crops. Experiments are also required to be carried out to test the suitability of other fertilizers, *e.g.* ammonium chloride.

Development Programmes in the Public Sector:

(a) *Schemes under implementation.*—The expansion of the Sindri Fertilizer Factory initiated during the First Plan is expected to be completed by the end of 1957 leading to an augmentation of the installed capacity from 70,000 tons (350,000 tons in terms of ammonium sulphate) to 117,000 tons of fixed nitrogen. The additional production corresponding to 47,000 tons of fixed nitrogen will consist of 148,000 tons of sulphate-nitrate and 24,000 tons of urea. The consumption of gypsum at Sindri will be increased by about 150,000 tons when full production under the expansion scheme is achieved. The total investment of about Rs. 8·4 crores expected to be incurred on this expansion during the Second Plan will be met from a loan of Rs. 4·4 crores provided by the Central Government and from the internal resources of the Company.

(b) *New projects to be taken up for implementation.*—The Central Government have decided to expand the fertilizer industry further under the Second Plan at the following locations:—

Location of plant	Annual capacity as fixed nitrogen (Tons)	Fertilizers to be produced	(Tons)	Estimated capital investment (Rs. crores)
(1) Nangal	70,000	Ammonium nitrate (pure or diluted)	200,000 (in terms of pure ammonium nitrate)	22·0
(2) Neyveli (under South Arcot Lignite Project)	70,000	(a) Sulphate-nitrate (b) Urea	200,000 40,000	19·0
(3) Rourkela	80,000	Nitrolimestone	442,000	16·0
(4) Bhilai (Bhilai steel plant) (5) Durgapur (Durgapur steel plant)	7,200	By-product ammonium sulphate	35,300	

The investment on (4) and (5) is included under the provision for steel plants in the public sector. Some of the details of these schemes are given below.

Nangal Fertilizer Factory.—Hydrogen for ammonia synthesis will be manufactured by the electrolytic process in cells of special design which will facilitate simultaneous production of heavy water intended to be used as a moderator in atomic reactors. The nitrogen requirements will be met from a liquid air plant. The project will require 160,000 KW of power which is to be supplied through the installation of power generators at the Bhakra Dam. The factory is expected to go into production by the end of 1959 and a production of 40,000 tons of nitrogen is expected in 1960-61.

The annual capacity of different sections of the plant will be ammonia 90,000 tons; nitric acid (on 100 per cent basis) 163,000 tons; ammonium nitrate 200,000 tons and nitrolimestone, the end-product 340,000 tons. The Fertilizer Production Committee has recommended the production of nitrolimestone by diluting the ammonium nitrate with clay and powdered limestone in the following proportion:—

Ammonium nitrate	60 per cent
Clay	26 "
Chalk	14 "

Neyveli Fertilizer Factory.—Gasification of lignite mined under the lignite development scheme is proposed to be adopted for the production of synthesis gas for ammonia production. When in full production, the plant is expected to consume about 400,000 tons of lignite whose composition, on the basis of representative samples of the material, is said to be: moisture 56 per cent, ash 2·5 per cent, volatile matter 22·4 per cent, fixed carbon 19·1 per cent. It will also require about 200,000 tons of gypsum per annum for the production of sulphate-nitrate. The fertilizer plant is at present scheduled to go into production by the end of 1960 and production up to 20,000 tons of nitrogen is envisaged in 1960-61. This is of course dependent on satisfactory progress being made with the plans for the mining of the lignite.

Rourkela Fertilizer Factory.—The adoption of the L. D. process of steel making by the Hindustan Steel Ltd., has improved the chances of low cost production of nitrogenous fertilizers at Rourkela on the basis of the large quantity of coke-oven gas rendered surplus. The liquid air plant installed for meeting the oxygen requirements of the steel plant will make available by-product nitrogen at practically no cost. In view of these advantages, the Government have decided upon the location of the third fertilizer plant in conjunction with the steel works. The fertilizer to be produced, *viz.*, nitrolimestone will make use of the limestone rejects of the steel plant for diluting the ammonium nitrate to the desired nitrogen content. The plant is envisaged to go into production by the middle of 1959 and a production of 70,000 tons of nitrogen is envisaged during 1960-61.

By-product ammonium sulphate.—As already explained, the production of by-product ammonium sulphate is linked with the coke-ovens of steel plants. On achieving full production, about 28,000 tons of sulphuric acid will be consumed annually. The coke-oven plant under the Durgapur Scheme of the West Bengal Government envisages the recovery of ammonia and sulphuric acid separately and not in the form of sulphate fertilizer.

Capital investment.—An overall investment of Rs. 65 crores is required for the fertilizer plants envisaged in the public sector.

Development Programmes in the Private Sector:

(*a*) *Schemes under implementation.—Expansion of FACT.*—It has to be pointed out that though technically FACT is in the private sector, since it is under private management, it is practically a public sector undertaking having regard to the size of the stake in it of the Madras and Travancore-Cochin State Governments. The general lines of development in hand at this unit are in accordance with the recommendations of the Technical Committee referred to earlier. In the first phase of the expansion, expected to be completed by 1958, the output of fertilizer products will be doubled. The subsequent stage will involve switching over the present plant for the manufacture of synthesis gas from wood, which is now being used as the primary gas producer, to electrolytic hydrogen. Nitrogen for the synthesis gas is proposed to be obtained from a liquid air plant. This expansion scheme will bring into existence the largest sulphuric acid plant in the country with a daily output of 150 tons. The consumption of electric power will expand by 24,000 KW in the first phase and by 48,000 KW on the completion of the entire scheme. The capacity for the production of nitrogenous compounds will be as under:–

	1955-56 (Tons)	From 1958-59 (Tons)
Ammonium sulphate	48,000	60,000
Ammonium chloride	8,000	8,000
Ammonium phosphate	Nil	16,500

The additional requirements of sulphur and rock phosphate for the production of these compounds from 1958-59 will be 19,000 tons and 12,500 tons respectively per annum.

Modified Soda Ash plant of the Sahu Chemicals.—A production of 40,000 tons of ammonium chloride per annum in conjunction with soda ash production by the modified soda ash process is envisaged by the Sahu Chemicals, who were granted a licence for the project in 1955. This plant is expected to come into production by about 1958.

By-product ammonium sulphate from expansion of TISCO and IISCO.—An additional output of about 15,000 tons of ammonium sulphate is envisaged from the expansion of by-product coking operations under the programme of increased steel production in the private sector.

(*b*) *Schemes under consideration.*—Certain proposals put forward by the Burmah Shell Refineries, for putting up a fertilizer plant with a capacity of 50,000 tons of fixed nitrogen per annum on the basis of refinery gases at Trombay are under examination.

Capital investment.—An investment of about Rs. 2·5 crores is expected on the expansion of FACT during the Second Plan. The investment on the scheme of Sahu Chemicals is covered under the alkali industry.

Progress of overall production of nitrogenous fertilizers during the period of the Second Plan.—On the basis of the schedules of development in the public and private sectors, the following is expected to be the availability of nitrogenous fertilizers from domestic sources during 1956-61 :—

Year	Annual installed capacity (Tons of fixed nitrogen)			Total production (Tons of fixed nitrogen)
	Public sector	Private sector	Total	
1956-57	70,000	15,000	85,000	85,000
1957-58	117,000	15,000	132,000	102,000
1958-59	117,000	25,000	142,000	140,000
1959-60	267,000	38,000	305,000	175,000
1960-61	344,000	38,000	382,000	290,000

B. PHOSPHATIC FERTILIZERS

I. Review of Progress in the First Plan

Targets.—The First Plan envisaged for the superphosphate industry a capacity target of 209,355 tons and a production target of 200,000 tons by 1955-56 as against corresponding figures of 123,460 tons and 55,089 tons in 1950-51. The development programme was formulated in 1951 against the background of (a) a serious shortage of sulphur and consequently of sulphuric acid, and (b) considerable reluctance on the part of cultivators to make use of phosphatic fertilizers for overcoming which extensive propaganda and education were required. Even the modest level of consumption in 1951 was achieved only by means of various types of inducements including a subsidy. In the circumstance, the targets visualised were comparatively modest.

Capacity and production.—The increase in capacity for superphosphate production has been mainly achieved through expansions carried out by various producers already in the field in 1951. Two new plants, which were expected to be completed in 1953-54, are now likely to go into production only during the Second Plan. The actual capacity in existence by the end of March 1956 is estimated at 212,120 tons per annum.

The regional distribution of the industry at the beginning and at the end of the Plan period is shown below:—

Regional distribution of capacity for superphosphate in 1950-51 *and at the end of the First Plan*

Region	Annual capacity on the basis of 330 working days			
	1950-51		1955-56	
	Number of units	Capacity (Tons)	Number of units	Capacity (Tons)
Bombay	7	59,000	6	70,220
Madras including Andhra	1	8,400	2	21,450
West Bengal	1	10,000	1	11,550
Mysore	2	7,500	2	9,900
Travancore-Cochin	1	18,000	1	49,500
Hyderabad	1	5,600	1	16,500
Delhi	1	15,000	1	33,000
TOTAL	14	123,500	14	212,120

As regards actual production, the statistics for the Plan period are as under:—

Year	(Tons)
1951-52	57,000
1952-53	50,000
1953-54	66,000
1954-55	102,000
1955-56	120,000 (Estimated)

Compared to what was originally visualised, there has been a considerable shortfall throughout the Plan period due to the failure of demand to expand as rapidly as was hoped.

The manufacture of more concentrated fertilizers, double and triple superphosphate, has been undertaken by one of the producers.

Imports.—Actual imports of all phosphatic fertilizers, which were mainly of those not so far produced in the country, *e.g.* ammonium phosphate, during the period of the Plan were:—

Year	Quantity (Tons)	Value (Rs. lakhs)
1951-52	52,941	62·17
1952-53	15,548	22·64
1953-54	44,397	65·43
1954-55	78,683	76·50
1955-56 (Ten months, April to January)	44,903	58·10

Consumption.—As already stated the offtake of superphosphate has been substantially lower than was estimated. After the abolition of the superphosphate pool in August 1952 the consumption decreased mainly due to difficulties in regard to marketing arrangements. It was only in early 1953 that the downward trend was reversed. During 1955-56, the trend of increased offtake has been impeded to some extent by the lack of adequate transport facilities during the manuring season and due to fall in the price of paddy. Consumption of superphosphate in 1955-56 is now expected to be about 120,000 tons as against the original estimate of 200,000 tons.

Action on recommendations.—In view of the absence of deposits of sulphur within the country, a suggestion was made that the possibilities of manufacturing dicalcium phosphate and kotka phosphate, which would eliminate or partially reduce the consumption of sulphuric acid, should be explored and further that standard specifications should be formulated for these alternative fertilizers in terms of citrate soluble P_2O_5 instead of water soluble P_2O_5. Work on these suggestions was undertaken at the National Chemical Laboratory, the Indian Standards Institution and the Delhi Cloth and General Mills Chemical Works. The results of the experiments have shown the practicability of the manufacture of kotka phosphate and dicalcium phosphate. Commercial production has been held up because the supply position of sulphur required in the production of superphosphate has improved. More rapid progress on alternative phosphatic fertilizers is envisaged under the Second Plan. The problems of the industry as well as its future lines of development have received the attention of the Development Council for Heavy Chemicals (Acids and Fertilizers) set up by the Ministry of Commerce and Industry in 1953.

II. Programme of Development in the Second Plan

Estimated requirements.—The present consumption of phosphatic fertilizers is extremely low, the ratio of fixed nitrogen to phosphorus (N: P_2O_5) currently consumed being 7:1 as against the corresponding figure of 2:1 in advanced countries. Although the results of the application of phosphatic fertilizers are not as spectacular and quickly discernible as is the case with nitrogen, repeated dosages of nitrogen alone without the requisite replenishment of phosphorus will ultimately fail to give increased yields. Keeping in view a target of N to P_2O_5 at 3:1, the target of consumption of phosphatic fertilizers by 1960-61 is put at about 120,000 tons of P_2O_5 per year. In connection with the formulation of the targets of production in the agricultural sector, the Ministry of Food and Agriculture have estimated the requirements of phosphatic fertilizers (including bonemeal), during the period of the Second Plan as under:—

Year	As P_2O_5 (Tons)	As superphosphate (Tons)
1956-57	50,000	300,000
1957-58	60,000	360,000
1958-59	80,000	480,000
1959-60	100,000	600,000
1960-61	120,000	720,000

The region-wise break-up of the demand in 1960-61 as visualised by the Food and Agriculture Ministry is given below:—

	(Tons of P_2O_5 per year)
(a) Zone (1) comprising Punjab, PEPSU, Rajasthan (North-West), U.P., Jammu & Kashmir and Delhi.	20,400
(b) Zone (2) comprising Rajasthan (except North-West), Ajmer, Madhya Bharat, Vindhya Pradesh, Madhya Pradesh, Bhopal, Saurashtra, Kutch, Bombay and Hyderabad	24,600
(c) Zone (3-A) comprising Mysore, Coorg, Travancore-Cochin, Madras & Andhra	35,700
(d) Zone (3-B) comprising Orissa, Bihar, West Bengal, Assam, Manipur and Tripura	38,800
ALL INDIA .	119,500

Before an accurate estimate of requirements can be framed in terms of different phosphatic fertilizers, further experiments need to be carried out on their suitability for different soils and under varying climatic conditions. It is, however, felt that for planning the production of phosphatic fertilizers under the Second Plan a capacity of about 500,000 tons might be visualised in terms of superphosphate and the balance in other types of phosphatic fertilizers to be decided later in the light of the results of experiments on their suitability or otherwise under different conditions.

Schemes under implementation.—The following projects for superphosphate production licensed by the Government during the First Plan are in varying stages of execution and are expected to go into production according to the completion dates mentioned against each:

	Superphosphate per annum (Tons)	Expected date of completion
(1) Shri Rama Chemicals, Madras.	49,500	1956-57
(2) Hindustan Heavy Chemicals, Calcutta.	5,400	1956-57
(3) Shaw Wallace and Co., Madras	33,000	1956-57
(4) Parry and Co. (at Kistna Canal, Andhra State)	100,000	1957-58
(5) Hyderabad Chemicals and Fertilizers (at Belampalle)	24,750	1956-57
(6) Pioneer Chemical Industries (in Madhya Pradesh)	33,000	1956-57
(7) Bihar Government Superphosphate Factory	33,000	1956-57
(8) Jayshree Tea Gardens, Calcutta.	33,000	1957-58
TOTAL .	311,650	

On the implementation of these projects, some of which like (4) and (7) above will be completed in more than one stage, the capacity for superphosphate production will go up to about 475,000 tons per annum and a further expansion of about 25,000 tons per annum will be required for achieving the capacity target for superphosphate.

With the implementation of the scheme of FACT for producing the compound fertilizer, ammonium phosphate (16 per cent N and 20 per cent P_2O_5) an additional 3,700 tons on P_2O_5 basis will be available so that the total of 87,000 tons of P_2O_5 (83,300 tons of P_2O_5 from

500,000 tons of superphosphate plus 3,700 tons of P_2O_5 from ammonium phosphate) will be available as against the overall demand of 120,000 tons of P_2O_5 by 1960-61. Further expansion of synthetic phosphatic fertilizers industry during the period of the Second Plan may not be necessary if the view is taken that the deficit will be made good by bonemeal. If, on the other hand, it is felt desirable to plan for meeting a large part of the deficit from synthetic phosphatic fertilizers, consideration may be given to the various alternative fertilizers like dicalcium phosphate and concentrated phosphatic fertilizers like double and triple superphosphate. Manufacture of dicalcium phosphate will provide a means of utilising the chlorine resulting from the manufacture of caustic soda by the electrolytic process. Early consideration should be given to the various aspects connected with the further expansion of phosphatic fertilizers industry. In this connection the advantages of producing phosphatic fertilizers by the electric furnace method should also receive attention. The Development Council for Heavy Chemicals (Acids and Fertilizers) have recommended that early steps should be taken by the Food and Agriculture Ministry to popularise dicalcium phosphate as a fertilizer.

Requirements of major raw materials.—The requirements of raw materials for the production of 500,000 tons of superphosphate, 18,000 tons of ammonium phosphate and about 100,000 tons of dicalcium phosphate, equivalent in all to 120,000 tons of P_2O_5, are as under:—

1. Sulphuric acid	220,000	tons
2. Rock phosphate	420,000	"
3. Hydrochloric acid expressed as chlorine equivalent	80,000	"

Estimated capital investment.—The fixed capital investment needed during the Second Plan for raising the capacity as indicated above, exclusive of the investment on sulphuric acid plants, is visualised at Rs. 2·5 crores.

Miscellaneous.—(1) In view of the importance of the increased use of phosphatic fertilizers to the agricultural economy of the country, a concerted drive for popularising them has to be undertaken. To this end, the National Fertilizer Association of India should organise the various necessary steps in the private sector. The preparation of balanced fertilizer mixtures and their popularisation in the countryside can play a useful part. The manufacture of concentrated fertilizers not requiring the use of sulphuric acid should also be encouraged.

(2) Since the cost of superphosphate and other phosphatic fertilizers appreciably influences their consumption, future developments should envisage substantially bigger plants. In this connection, the recommendations of the Development Council for Heavy Chemicals (Acids and Fertilizers) that the minimum daily capacity of superphosphate plants should be not less than 100 tons has considerable importance.

The following table summarises the development of the phosphatic fertilizers industry during the period of the Second Plan.

		1955-56	1960-61
		(Tons)	(Tons)
Annual installed capacity			
(a) Superphosphate	(In terms of P_2O_5)	35,000	83,300
(b) Ammonium phosphate	Do.	Nil	3,700
Total including others	Do.	35,000	120,000
Actual production			
(a) Superphosphate	Do.	20,000	83,300
(b) Ammonium phosphate	Do.	Nil	3,700
Total including others	Do.	20,000	120,000

C. POTASSIC FERTILIZERS

I. Review of the Progress in the First Plan.

Targets.—No specific targets for capacity and production to be achieved by 1955-56 were proposed in the First Plan, but the following general recommendations were made:—

(a) Efforts should be made to encourage the bigger salt manufacturers to put up by-product recovery plants and make the required quantities of potassium chloride available for fertilizer and other purposes. Encouragement should also be given to such firms to split the double salts containing potassium chloride and purify the crude product for producing higher grade material so as gradually to displace the product now being imported from abroad.

(b) The State Governments of Bihar, U. P., PEPSU and Rajasthan should take necessary steps to organise cottage scale manufacture of potassium nitrate on a co-operative basis so as to increase the output of the product and also to bring down its cost.

(c) Potassium salts should be recovered from molasses as well as distillery slops by adopting suitable processes, which may be standardised by the manufacturers of sugar and alcohol in consultation with the National Chemical Laboratory.

No progress worthy of note has been made on the above recommendations during the last five years.

II. Programme of Development in the Second Plan.

The requirements of potassic fertilizers have been estimated as under by the Ministry of Food and Agriculture:—

	(Tons in terms of K_2O)
1955-56	10,000
1956-57	12,000
1957-58	15,000
1958-59	20,000
1959-60	25,000
1960-61	30,000

As regards industrial demand for potassium salts, the most important arises from the needs of the potassium chlorate industry for potassium chloride. During the Second Plan, more attention should be paid to the recommendations made in the First Plan with a view to reducing dependence on imports.

24. HEAVY CHEMICALS

The products covered under the term 'Heavy Chemicals' are sulphuric acid, soda ash, caustic soda and miscellaneous chemical products manufactured in large quantities.

A. SULPHURIC ACID

I. Review of Progress in the First Plan.

Targets, capacity and production.—The expansion of the sulphuric acid industry under the First Plan, principally for meeting the expanding demands of the fertilizer and rayon industries, was expected mainly to take the form of the completion of the schemes under implementation at the beginning of 1951. As against a capacity target of 220,791 tons per annum to be attained by the end of the Plan, the actual installed capacity is now of the order of 240,000 tons. The region-wise distribution of the capacity at the end of the First Plan, as compared to the corresponding figures for June 1952 outlined in the volume, "Programmes of Industrial Development, 1951-56" is as under:—

Region	Annual rated capacity in terms of 100 per cent acid (330 working days)	
	June 1952 (Tons)	April 1, 1956 (Tons)
Assam	6,600	6,600
West Bengal & Bihar	56,560	79,770
Bombay	35,013	57,025
Punjab & Delhi	14,955	12,380
Uttar Pradesh	5,775	5,445
Madhya Pradesh	825	1,650
Madras	13,530	15,180
Travancore-Cochin	56,183	43,560
Rest of the Indian Union		20,395
TOTAL	189,441	242,005

The distribution of the plants, capacity-wise shows the following pattern:—

	Number of units	Aggregate annual capacity (Tons)
Units with a daily capacity of :—		
Less than 5 tons	12	7,900
From 5 tons to below 10 tons	5	10,740
From 10 tons to below 25 tons	18	66,330
25 tons and above	13	157,035
TOTAL	48	242,005

The addition to the installed capacity during the First Plan, amounting in all to about 110,000 tons was contributed by 8 contact sulphuric acid plants which went into production by June 1952 and 5 others built up subsequently.

As regards production, the difficulties connected with the supply of sulphur impeded expansion in the earlier years and in the subsequent period, it remained at a low level compared with the target envisaged due to lack of demand. Actual production during the period of the Plan was as follows:—

1951-52	129,000	tons
1952-53	96,000	"
1953-54	120,000	"
1954-55	160,000	"
1955-56	170,000	" (Estimated)

Consumption.—As against a consumption of 200,000 tons of acid visualised for 1955-56, the actual offtake is now estimated at about 160,000 tons. This is primarily due to lower demand for superphosphate—120,000 tons according to current estimates compared to the target of 200,000 tons for the last year of the First Plan. This reduction alone accounts for a shortfall of 32,000 tons in the consumption of sulphuric acid.

Action on recommendations.—The following developments which were visualised under the First Plan have made no progress or have fallen considerably behind schedule:—

(a) No progress has been made on the alteration of one of the sulphuric acid plants of the Fertilizers and Chemicals (Travancore) to enable it to be operated on pyrites in place of sulphur. By and large, the improvement in the international supply position of sulphur, increase in the price of foreign pyrites, higher capital expenses in plants based on pyrites and the absence of definite data regarding the extent of pyrites deposits available for exploitation within the country held up action by manufacturers on the substitution of pyrites for sulphur as a raw material in sulphuric acid manufacture.

(b) No significant progress has been made on the proposal for the production of 100 tons of sulphur per day from gypsum, which was under scrutiny at the commencement of the Plan. The cost of production of sulphur from gypsum is usually high, but with the high prices of sulphur ruling in 1951, the project appeared worthwhile. Since then, owing to improvement in the supplies of sulphur, the position has changed materially. In view of the possibility of large reserves of pyrites being available from Amjor deposits, a comparative assessment of costs of production from gypsum and pyrites is being made.

(c) No progress was made in the recovery of sulphur from the smelter gases of the Indian Copper Corporation, Ghatsila, primarily due to difficulties in ensuring in advance a steady market for the acid that would be produced from this source.

(d) Work on the sulphuric acid plant of the Bihar Government Superphosphate Factory in the public sector and on the gypsum-sulphuric acid plant (mentioned as the Raja of Venkatagiri plant and now known as the scheme of Shri Rama Chemicals) is considerably behind the original schedule envisaged. These are now expected to be completed at the beginning of the Second Plan.

The successful designing and fabrication of a new 30-ton sulphuric acid plant by the National Rayon Corporation is worthy of special mention. Except for sulphur pumps, air blower, catalyst and instruments, all the other equipment of the plant was indigenously fabricated. The plant has been in production for about one year and has proved satisfactory. The National Rayons have been licensed for fabrication of sulphuric acid and other chemical plants. As a result of the experience gained by this unit and some others engaged in this field, it is expected that several of the new plants to be established in future will be designed and fabricated within the country save for certain essential items like the catalyst and instruments.

Development Council for Heavy Chemicals (*Acids and Fertilizers*).—In accordance with the provisions of the Industries (Development and Regulation) Act, 1951, the Ministry of Commerce and Industry set up a Development Council for Heavy Chemicals (Acids and Fertilizers) in 1953. Attention is being given by this body to various questions connected with the working of the acid industry with special reference to the lines of future development. After discussions between the Development Council and the Development Wing, ceilings on the selling prices of sulphuric acid in relation to the price of sulphur have been specified and are being applied to all the manufacturers. As regards the size of new sulphuric acid plants, the Council have recommended that, save in exceptional circumstances, no unit of less than 50 tons sulphuric acid capacity per day should be licensed as adjuncts to superphosphate units.

II. Programme of Development in the Second Plan.

Estimated requirements.—An approximate estimate of the actual consumption in 1955-56 and the expected pattern of requirements by 1960-61 is furnished in the following table:—

	Estimated consumption of sulphuric acid in 1955-56 (Tons)	Estimated requirements of sulphuric acid in 1960-61 (Tons)
Consumer industry or sector:—		
1. Fertilizer industry:		
(a) Ammonium sulphate and phosphate	40,000	120,000
(b) Superphosphate	48,000	200,000
2. Steel pickling, etc.	7,000	15,000
3. Petroleum refining	7,000	10,000
4. Industrial explosives	..	3,000
5. Aluminium sulphate and other inorganic heavy chemicals	15,000	24,000
6. Rayon and staple fibre	21,000	58,000
7. Miscellaneous	22,000	40,000
TOTAL	160,000	470,000

The expansion of consumption in connection with the production of ammonium sulphate is expected to result mainly from the operations of new by-product coke-oven plants to be established in conjunction with the steel expansion programmes in the public and private sectors. In this connection it may be pointed out that as a result of trials carried out at Jamshedpur, in consultation with the German firm of F. J. Collin A. G., a process has been evolved and a plant is under installation at TISCO for the recovery of sulphate of ammonia from coke-oven gases by utilising the waste pickling liquor from the galvanising section of the sheet mills instead of using sulphuric acid as hitherto. The new ferro-sulphate washing plant that is being installed at Jamshedpur on the basis of this process will eliminate the consumption of additional quantity of the acid in their works for the production of ammonium sulphate. A three-fold increase in sulphuric acid consumption in the manufacture of superphosphate is envisaged on the basis that about 80,000 tons out of the total of 120,000 tons of P_2O_5 will be turned out as single superphosphate with an average P_2O_5 content of 16 to 17 per cent. An increase of about 150 per cent in the consumption of the acid by the rayon and staple fibre industry is another factor contributing to the high levels of demand expected by 1960-61. Among miscellaneous industries, the production of dyestuff intermediates and DDT will be the principal consumers and a part of their requirements will be in the form of oleum of high concentration.

The requirements of industries in the public sector are estimated at 60,000 tons of sulphuric acid by 1960-61. This is exclusive of the requirements of Defence industries.

Schemes licensed and under implementation.—The following schemes are expected to be at varying stages of implementation:—

Schemes	Sulphuric acid: Annual capacity (Tons)
New Units:—	
1. Parry & Co., Kistna Canal, Andhra	9,900
2. Shri Rama Chemicals, Madras	11,500
3. Bihar Government Superphosphate Factory, Sindri	8,250
4. Shaw Wallace and Co., Calcutta.	8,250
5. Pioneer Chemical Industries, Nagpur	16,500
Expansions:—	
1. Hyderabad Chemicals & Fertilizers, Secunderabad	9,900
2. Bengal Chemical & Pharmaceutical Works, Calcutta	8,250
3. Indian Iron & Steel Co., Burnpur	16,500
4. Shambunath & Sons, Amritsar	990
5. Fertilizers & Chemicals (Travancore)	55,000
6. D. C. M. Chemical Works, Delhi	16,500
7. Tata Iron & Steel Co., Jamshedpur	16,500
TOTAL	178,040

None of the new comers in the rayon industry have applied for establishing sulphuric acid plants as adjuncts to rayon manufacture so that it is presumed that they will procure their requirements from the market. Two acid plants are, however, envisaged in connection with the three new steel plants in the public sector. The capacity of the units in these steel plants is placed at about 100 tons of acid per day, *i.e.* 33,000 tons per annum, which will be consumed for the fixation of by-product ammonia in coke-oven plants, and for the recovery/processing of by-product chemicals. A sulphuric acid plant of 3,000 tons annual capacity is also expected to be established as an adjunct of the Durgapur Coke-Oven Scheme of the West Bengal Government. It is interesting to note that sulphur recovered from coke-oven gas will constitute the raw material for the manufacture of sulphuric acid at this factory. The Bihar Government after the completion of the programme for superphosphate production included in the First Plan, propose to increase the production of sulphuric acid by installing another unit of 25 tons daily capacity so as to meet the requirements of acid for the expansion of the output of superphosphate to about 40,000 tons per annum.

On the completion of all these projects, the capacity for sulphuric acid is expected to be increased by about 220,000 tons per annum over that in April 1956. Further capacity is expected to be installed in conjunction with schemes for the production of superphosphate, rayon and staple fibre.

Targets of capacity and production.—A capacity target of 500,000 tons of acid is proposed for this industry in the Second Plan so that the estimated requirements of 1960-61 could be met on the basis of 95 per cent of utilisation of installed capacity.

Requirements of raw materials.—All the sulphuric acid units are based on the use of imported sulphur with the exception of the plants of Shri Rama Chemicals, the Pioneer Chemical Industries and the unit which is to form part of the Durgapur Coke-Oven Scheme. Whereas the first and second will operate on gypsum and pyrites respectively, the Durgapur unit will be based on sulphur from the coke-oven gas. The consumption of raw materials in 1960-61, is envisaged as under:—

	Tonnage of acid	Consumption of raw materials (Tons)
(i) Sulphur	450,000	160,000
(ii) Pyrites	8,000	7,000
(iii) Gypsum	10,000	20,000
(iv) Sulphur from coal	13,000	1,000 tons of combined sulphur.

It may be of interest to mention that the total requirements of sulphur for all uses in 1960-61 will exceed 200,000 tons on the following basis:—

	(Tons)
(a) For sulphuric acid manufacture	160,000
(b) For carbon disulphide manufacture	12,000
(c) For the sugar industry	14,000
(d) Miscellaneous demands (paper, rubber, matches, manufacture of sulphur dioxide, fire works industries).	20,000
	206,000

Foreign exchange requirements for importing the above quantity of sulphur will be more than Rs. 5 crores by 1960-61. In view of the strategic importance of this raw material, the National Industrial Development Corporation is examining a scheme for the establishment of a plant based on the Orkla process for the manufacture of sulphur from pyrites. The scheme is at present in the preliminary stage of examination.

Miscellaneous: (a) Economic size.—In the interest of producing the acid at a low cost, new units, so far as possible, should be of not less than 25 tons daily capacity. As already mentioned, plants attached to phosphatic fertilizer units should have a minimum capacity of 50 tons of sulphuric acid per day.

(b) Transport facilities for the bulk movement of acid.—On the basis of the Development Council's assessment of requirements of tank wagons for movement of acid in bulk the Railway Board have planned for a considerable augmentation of their tank wagon fleet.

The following table summarises the programme of development of the sulphuric acid industry during the Second Plan:—

	1955-56 (Tons)	1960-61 (Tons)
Annual capacity	242,000	500,000
Production	170,000	470,000

B. SODA ASH

I. Review of the Progress in the First Plan

Targets.—The First Plan envisaged the expansion of both the units in existence as a result of which the installed capacity was to increase from 54,000 tons in 1950-51 to 86,000 tons by 1955-56. The total expenditure on the expansion schemes was estimated at Rs. 75 lakhs. The target for actual production was 78,000 tons in the last year of the Plan.

Capacity and production.—The expansion scheme of the Tata Chemicals, which was mainly financed from the internal resources of the company and short-term borrowings, was completed in two stages. The capacity was stepped up to 120 tons per day by the end of 1953 and to 140 tons per day in the following year. The Tariff Commission have, however, observed in their 1955 Report on the Soda Ash Industry, that, in order to maintain production at this level throughout the year, it would be necessary (a) to extend the salt works, (b) to convert one more absorber to the packed type, (c) to instal an additional carbon dioxide compressor, (d) to improve the refrigerating system, and (e) to improve the system of gas distribution in the carbonating towers. Some of these works have been completed and the factory is regularly producing about 140 tons per day of soda ash.

The expansion and modernisation of the plant of the Dhrangadhra Chemical Company was assisted by a loan of Rs. 50 lakhs granted by the Industrial Finance Corporation of India. The expansion programme, which was completed before the end of 1954, involved the installation of additional equipment such as a new lime kiln, a new ammonia still, a new absorber unit, a set of new carbonators, an additional carbon dioxide compressor and a duplicating refrigerating unit, all of which cost Rs. 83 lakhs. It is stated that an additional investment of Rs. 15 lakhs will be needed to remove the remaining bottlenecks and enable the plant to work at its daily capacity of 120 tons throughout the year.

The installed capacity of the soda ash industry in 1955-56 is 90,000 tons as a result of these developments.

The production of the indigenous manufacturers averaged 47,000 tons per annum during 1951-53 and 55,000 tons per annum in the following two years. It has shown a substantial rise during 1955-56 and the output is estimated to have reached 80,000 tons. Labour troubles at the Mithapur plant affected the production of Tata Chemicals in 1952 and the closure of the Dhrangadhra plant for 5 months in 1954 for additions and alterations reduced its output during that year. The figures given below indicate the trends of production at the two plants.

Production of soda ash at Mithapur and Dhrangadhra ('000 tons).

	1951	1952	1953	1954	1955
Tata Chemicals	27·4	27·3	37·5	41·4	46·9
Dhrangadhra Chemical works	20·1	16·1	19·3	6·8	30·4

The quality of the domestic soda ash was generally satisfactory and it fulfilled the requirements of the ISI specification in regard to sodium carbonate content and limit for sodium chloride. Consultations have been initiated with the industry by the Indian Standards Institution for revising the specifications of soda ash.

Imports.—The import policy followed by the Government and the high prices ruling since 1951 have given an impetus to this nascent industry, though the heavy imports allowed in the first two years of the Plan caused some temporary difficulties to indigenous producers owing to accumulation of stocks.

Imports during 1951-56 were as under:—

Year	Quantity (Tons)	Value (Rs. crores)
1951-52	82,312	2·82
1952-53	81,288	2·24
1953-54	40,617	1·51
1954-55	67,710	2·63
1955-56 (Ten months, April—January)	59,673	1·43

Since 1955 the import of soda ash has been canalised by the Government. The material is distributed by two leading distributing firms to the consumers at a controlled price. This has resulted in stabilising the market price of soda ash from 1954.

Consumption.—The Plan anticipated that the consumption of soda ash would increase to 155,000 tons by 1955-56 as a result of the expansion of demand in different sectors. Actually, consumption is likely to be lower, mainly due to the low levels of production in the glass industry. In their Report of 1955 on the continuance of protection to the Soda Ash Industry, the Tariff Commission estimated the current requirements of soda ash as well as future requirements by 1958 as under:—

Estimates of requirement assessed by the Tariff Commission

Industry	Current (Tons)	Future (1958) (Tons)
Glass	35,000	40,000
Silicate	10,000	12,000
Textiles	6,000	6,000
Paper	4,000	4,000
Bichromate	3,000	4,500
Caustic soda	6,000	9,000
Sodium bicarbonate	1,600	2,800
Other chemicals	1,000	1,200
Miscellaneous	4,000	5,000
Laundries, *dhobies*, etc.	50,000	55,000
TOTAL	120,600	139,500

The break-up of current annual demand places the requirements of dense soda ash or Magadi ash at 40,000 tons and of light ash at 90,000 tons.

Action on recommendations.—At the time of drawing up the First Plan, it was considered that even after reckoning on the expansion schemes of the existing manufacturers, there would be need for two new soda ash plants each of about 100 tons daily capacity to help to bridge the gap between demand and indigenous supplies. It was recommended that one of the units should arrange to manufacture dense soda ash required by the indigenous glass and bichromate industries. It was also recommended that a thorough examination of the prospects and a study of suitable sites for soda ash plants should be immediately undertaken by a Committee of technical experts under the Development Wing of the Ministry of Commerce and Industry.

The Development Wing of the Ministry of Commerce and Industry carried out an extensive survey of production costs at some of the appropriate locations in the country and prepared a report outlining the future lines of expansions of the industry.

Tariff protection.—Protection to the soda ash industry was first extended up to December 1953 and renewed subsequently up to the end of 1954. Protective duties were levied at 30 per cent *ad valorem* preferential and 40 per cent *ad valorem* standard, keeping the tariff value at Rs. 13-8-0 per cwt. On a review of the claim of the industry to further continuance of protection, the Tariff Commission recommended extension of protective tariffs on a stable basis until the end of December 1958 at the standard rate of 30 per cent; the preference rate being fixed in accordance with the Indo-U. K. Trade Agreement. The Government accepted the recommendations but decided on practical considerations to levy duties at specific rates of Rs. 5-10-0 per cwt. (standard) and Rs. 4-3-0 per cwt. (preferential) which would ensure to the industry on a stable basis the quantum of protection needed.

Consumption of raw materials.—Since 1952, the plants at Mithapur and Dhrangadhra have as a result of additions and alterations to different sections and improvements in process control, endeavoured to secure economy in the consumption of major raw materials. The following data given by the Tariff Commission furnish the level of consumption in 1952-53 and 1953-54 and estimates for the future:—

Consumption of major raw materials

(Per ton of soda ash)

Material	Unit	Tariff Board's estimate of 1951	Tata Chemicals			Dhrangadhra Chemical Co.		
			1952-53	1953-54	Estimate for future	1952-53	1953-54	Estimate for future
1. Salt . . .	Tons	2·0	2·22	2·26	1·9	1·697	1·747	1·650
2. Limestone . .	,,	1·75	1·610	1·494	1·5	1·582	1·632	1·600
3. Ammonium sulphate	Lbs.	60·0	60·48	49·28	36·0	52·86	42·34	36·0
4. Coke . . .	Tons	0·15	0.12	0·105	0·10	0·113	0·118	0·112

Price level of soda ash.—Broadly speaking, the domestic manufacturers have had a very favourable price level within the country since 1952. The selling prices of indigenous soda ash remained at about Rs. 22 per cwt. from June 1952 to September 1954 except during the period from December 1952 to March 1953 when there was a fall of about Rs. 2 per cwt. Since canalisation of imports of soda ash in 1955 the selling price has been reduced to Rs. 19-8-0 per cwt. On the basis of costs from 1955 onwards as estimated by the Tariff Commission in respect of the output of the two existing producers, the fair selling price of soda ash produced by Tata Chemicals and Dhrangadhra Chemical Works is Rs. 17 and Rs. 16-14-6 per cwt. at Bombay.

II. Programme of Development in the Second Plan

Estimated requirements.—After taking into consideration the anticipated demands from different sectors, the Development Wing of the Ministry of Commerce and Industry made an assessment of the requirements of soda ash by 1960-61. This has also been approved by the Development Council for Heavy Chemicals (Alkalies).

Break-up of estimated requirements of soda ash in 1960-61

Consumer industry	Estimated requirements of soda ash (Tons)
Caustic soda	45,000
Sodium bicarbonate	6,000
Sodium silicate	18,000
Bichromates	6,000
Photographic and pharmaceutical chemicals	2,000
Dyestuff, soap, vanaspati and petroleum industries	2,000
Metallurgy	1,000
Glass and bangles	70,000
Paper and pulp	4,500
Textile industry	7,000
Miscellaneous	7,000
Laundries and *Dhobies*	60,000
TOTAL	228,500
or approximately	230,000

Schemes licensed and under varying stages of implementation.—Government have approved the following projects sponsored by private enterprise and issued licences under the Industries (Development and Regulation) Act, 1951.

Development schemes for expansion of soda ash industry

	Additional annual capacity (Tons)	Remarks
Tata Chemicals (Expansion)	21,600	Standard Solvay process.
New units—		
(1) Plant of Jiyajeerao Cotton Mills to be located at Porbandar (Saurashtra)	66,000	32,400 tons to be converted to caustic soda.
(2) Dhrangadhra Chemical Company, Tuticorin plant	36,000	By conversion of 28,800 tons of electrolytic caustic soda.
(3) Sahu Chemicals, Dalmianagar	40,000	Modified Solvay process.
TOTAL	163,600	

It is envisaged that 50 per cent of the daily output of the Porbandar plant would be utilised for the production of caustic soda and that the unit adopting the modified process would produce along with soda ash an equal quantity of ammonium chloride to be used as a fertilizer. The soda ash production at Tuticorin is planned on the basis of carbonation of caustic soda obtained by the electrolytic process. All the new units are expected to instal equipment for conversion of part of their production to heavy soda ash.

Additional capacity required.—The addition to installed capacity for soda ash production on the completion of the schemes licensed so far would, as already pointed out, amount to about 163,600 tons. Thus, inclusive of the present facilities, the overall capacity for soda ash will rise to 253,000 tons. Except for the expansion scheme of the Tata Chemicals all the schemes are in the early stage of development at the commencement of the Second Plan. Discussion regarding consultants, raising of resources, etc., are in progress and regular production can be expected only in the latter half of the Plan period. If all the schemes are implemented in the next four years, the capacity should be adequate to meet the anticipated demands in full. Nevertheless, the question of establishing further capacity for soda ash needs to be kept under review, primarily in connection with developing caustic soda production by the chemical process which is discussed under caustic soda.

Estimated production.—The following levels of production of soda ash are envisaged during 1956-61:—

Year	(Tons)
1956-57	85,000
1957-58	90,000
1958-59	120,000
1959-60	175,000
1960-61	230,000

It is necessary to ensure conformity to the production pattern expected for each project so that, in addition to light ash, heavy ash essential for glass, bichromate and a few other industries is also manufactured according to the requirements.

Investment.—The overall fixed investment on the expansion of the soda ash and caustic soda industries in the private sector during the Second Plan is estimated at Rs. 16·5 crores. Foreign exchange required for the import of plant and machinery is estimated at Rs. 10 crores.

Developments in the public sector.—No major development programmes are envisaged in the public sector during 1956—61. The Five Year Plan of Rajasthan contains, however, a provision of Rs. 5·0 lakhs for pilot plant work on the recovery of sodium sulphate and sodium carbonate from the bitterns of Sambar Salt Works.

The following table summarises the programme of development of the soda ash industry:

	1955-56	1960-61
1. Number of plants	2	5
2. Annual installed capacity (Tons)	90,000	253,000
3. Production (Tons)	80,000	230,000
4. Output available for sale as soda ash (Tons)	75,000	185,000

C. CAUSTIC SODA

I. Review of progress in the First Plan

Targets.—The capacity and production targets for the caustic soda industry under the First Plan were 37,125 tons and 33,000 tons by 1955-56 as against the level of 18,725 tons and 11,375 tons obtaining in 1950-51. These targets were exclusive of the capacity and production of the four plants attached to paper mills which catered for consumption within the works and was estimated at about 4,000 to 4,500 tons in 1951.

Capacity and production.—The caustic soda industry has made considerable progress during the First Plan as the following data show:—

Year	Number of factories in operation	Installed capacity (Tons)	Production of entire industry (Tons)
1950	9	21,200	13,458
1951	9	27,552	16,015
1952	11	28,344	16,655
1953	8	36,990	22,831
1954	12	41,660	29,307
1955	12	44,300	34,253

Thus the annual capacity at the beginning of 1956 is about double the figure of 1950-51 for the entire industry including the units attached to paper mills. The increase is accounted for by two new units and the substantial expansions of five existing plants. Of the total capacity, 6,600 tons is for chemical caustic soda and the balance for electrolytic caustic soda. Of the capacity for electrolytic caustic soda, mercury cells producing rayon grade caustic soda account for 6,600 tons per annum. Production of rayon grade caustic soda was started in 1952.

Though there has been considerable expansion in output, the quality of indigenous caustic soda cannot at present be compared, by and large, with the imported product, being low in sodium hydroxide content at 94-95 per cent as compared to 98 per cent in the imported variety and having a higher percentage of sodium chloride as impurity. Attention has recently been drawn to these defects by the Tariff Commission and the Development Council. Some steps are being taken to instal additional equipment for improving the quality.

The actual production of caustic soda was even in 1955 considerably below the installed capacity. The main factor responsible for this is the difficulty in finding profitable outlets for the chlorine simultaneously produced in the electrolytic process. In certain plants, shortage of power has also been a factor accounting for the low level of production. The success of the electrolytic caustic soda industry will depend, to a considerable extent, in the coming years on the development of a sufficient demand for chlorine and this problem of the disposal of chlorine has to be assigned a high priority during the period of the Second Plan.

The production in 1955 consisted of 23,383 tons in the form of liquid caustic soda and 9,825 tons as fused solid, the remaining 1,045 tons having been produced in the form of flakes. This is a welcome trend, for the use of caustic soda in lye form does not require fuel for fusion or steel sheets for packing. But for such a pattern of production, tank wagons for the movement of caustic liquor play an important part. The Railways are providing some tank wagons for this and have planned for a further increase.

Imports.—Imports of caustic soda during the period of the Plan were as under:—

Year	Quantity commercial (Tons)	Rayon grade (Tons)	Total (Tons)	Value of all imports (Rs. crores)
1951-52	N. A.	N. A.	62,750	3·79
1952-53	N. A.	N. A.	25,543	1·08
1953-54	45,530	3,823	49,353	2·90
1954-55	42,005	7,252	49,257	2·57
1955-56 (Ten months, April—January)	..	..	45,670	2·63

The indigenous industry has, on the whole, benefitted by the policy of quantitative regulation of imports followed by the Government during these years, though the heavy imports allowed in 1951-52 created temporary difficulties in regard to marketing the domestic production. The Government have from 1956 included caustic soda also in their canalisation of import and controlled distribution programme.

Consumption.—The First Plan envisaged that the requirements of caustic soda would rise from 54,000 tons in 1951 to 58,000 tons by 1952-53 and 87,000 tons by 1955-56. Increases in demand were expected to arise chiefly from the higher level of production expected in the soap, paper and rayon industries. The actual consumption during the five years has shown some divergence from the estimates in specific industries; for example, it was lower than the estimated level in the soap industry, but higher in the cotton textile industry due to increase in mercerising plants in textile mills and demands from the handloom sector and art silk mills. Consumption in 1955-56 is now estimated as under:—

Industry	Estimated production in 1955-56 (Tons)	Estimated consumption of caustic soda in 1955-56 (Tons)
Soap	220,000	16,000
Paper and paper-board	200,000	25,000
Textiles	..	23,000
Rayon and staple fibre	28·0 plus 1·5 million lbs. of transparent paper	13,000
Petroleum refining	..	1,500
Chemicals including dyestuffs	..	1,270
Aluminium	7,500	1,500
Miscellaneous	..	2,500
	TOTAL	83,770

The above estimates broadly correspond with the assessment made by the Tariff Commission in their Report on the continuance of protection to the Caustic Soda and Bleaching Powder Industry, 1954.

Tariff protection.—The protective duties in force up to May 1951 were withdrawn by the Government following the spurt in the prices of caustic soda in the wake of the Korean War. In spite of the fact that the fair selling price of indigenous caustic soda (Rs. 27-2-0 per cwt. as estimated by the Tariff Board) was lower than the selling price of imported caustic soda fixed under the Supply and Prices of Goods Act, 1950 at Rs. 40-6-0 per cwt., Government allowed the domestic producers to market their caustic soda at the higher rate with the intention that the indigenous industry should take advantage of the arrangement to strengthen its financial position. The maximum price fixed by the Government did not apply to caustic lye and this gave some further benefit to the domestic industry. When the heavy imports of caustic soda in 1951-52 began to affect adversely the domestic industry, an application for a re-examination of the position was made by four of the indigenous producers. Accordingly, the Government ordered a fresh enquiry in July 1952 and the Tariff Commission submitted their report in 1954. On the basis of the recommendations made by the Tariff Commission, the Government agreed to protection being given to this industry up to December 31, 1958. The scheme of protection, which is related to the cost structure of electrolytic soda and excludes the chemical caustic soda envisages a protective duty of 27·3 per cent *ad valorem* (preferential rate) and 37·3 per cent *ad valorem* (standard).

Raw materials and power.—According to the estimate made by the Tariff Commission in their latest Report, soda ash and lime were consumed at the rate of 1·6 tons and 1·0 ton respectively in the chemical process of caustic soda production. The consumption of salt in the electrolytic process, being dependent on the purity and the sodium chloride content of the salt used, showed considerable variation. Average consumption is assumed at 2·0 tons of salt per ton to caustic soda which would be reduced to 1·85 tons when mercury cells are used. The high percentage of sodium sulphate present in Sambhar salt increases the processing costs considerably in units depending on it as raw material. To overcome this disability, consideration has to be given to the installation of washing plants at the Sambhar Salt Works.

As regards electric power, the trend has been generally in favour of obtaining the requirements from external sources of supply, though at present 4 units generate their own power. The number of units of power (KW-hr) required per ton of caustic soda has on an average been assumed at 3,500 by the Tariff Commission. In actual practice, it varied between 3,280 and 3,945 during the first three years of the Plan. The cost of power has also varied widely from plant to plant, the extreme limits being 1·25 annas and 0·371 anna per KW-hr.

Action on recommendations.—Having regard to the acute problem of chlorine disposal faced by the industry, it was recommended in the First Plan that high priority should be given to all plans for the utilisation of chlorine such as the manufacture of DDT, chlorinated rubber, chlorinated solvents and dicalcium phosphate using hydrochloric acid produced from chlorine. Though some progress has been made in stimulating outlets for chlorine, its disposal continues to be a considerable problem. The electrolytic caustic soda plants in operation had by the end of 1954 a potential capacity for the production of 30,475 tons of chlorine gas while the demand was only 17,150 tons. The consumption in 1955-56 is estimated at about 20,000 tons, which represents only 66 per cent of the potential supply. No progress has been made in regard to the production of dicalcium phosphate which is an important oulet for chlorine. Work on this development is still in the stage of semi-commercial trials. The Tariff Commission has recommended that in all future expansions or new units special emphasis must be given to devising ways for the integrated utilisation of chlorine.

II. Programme of Development in the Second Plan

Estimated requirements.—It is envisaged that the requirements of caustic soda will go up to about 140,000 tons by 1960-61 representing an increase of about 66 per cent over the level obtaining in 1955-56. Consumption in the rayon industry, which will be in the form of rayon grade caustic soda of 98-99 per cent purity, is expected to expand to 44,000 tons by 1960-61. Increases in other sectors are for the soap, paper, aluminium, dyes and miscellaneous chemical industries. The break-up of the requirements is expected to be as under:—

	Estimated requirements of caustic soda in 1960-61 (Tons)
Soap	25,000
Paper and paper-board	27,000
Newsprint	3,000
Textiles	26,000
Rayon and staple fibre	44,000
Aluminium	4,000
Petroleum refining	2,200
Chemicals including dyestuffs	4,000
Vanaspati	2,800
Miscellaneous	3,000
TOTAL	141,000

In addition, it is envisaged that about 28,800 tons of caustic soda will be consumed for conversion to soda ash so that the total requirements for all purposes will amount to 168,800 tons by 1960-61.

Schemes licensed and under implementation.—In accordance with the provisions of the Industries (Development and Regulation) Act, 1951, the Central Government have approved the following schemes, the implementation of which is expected to extend into the Second Plan.

	Location	Annual capacity (Tons)
Caustic soda by the Chemical Process:		
1. Soda Ash Plant of Jiyajeerao Cotton Mills at Porbandar	Porbandar	20,400
2. Expansion by Tata Chemicals	Mithapur	600
		21,000
Caustic soda by the Electrolytic Process:		
1. Expansion of D. C. M. Chemicals (balance)	Delhi	3,660
2. Heavy Chemicals Ltd.	Tuticorin	1,650
3. Orient Paper Mills	Brijrajnagar	3,240
4. Calico Chemical Division	Bombay	2,160
5. National Rayon Corporation	Kalyan	7,000
6. J. K. Chemicals	Bombay	1,000
7. Rohtas Industries (Expansion scheme)	Dalmianagar	3,600
8. Mettur Chemicals (Expansion scheme)	Mettur Dam	2,040
9. Tata Chemicals (Expansion scheme)	Mithapur	774
10. Dhrangadhra Chemical Company	Tuticorin	60,000
	TOTAL	85,124

Assuming that these schemes are duly implemented, the annual installed capacity of the industry will be as under:—

	Existing capacity	Schemes permitted	Total
	(Tons)	(Tons)	(Tons)
Chemical caustic soda	6,600	21,000	27,600
Electrolytic caustic soda	37,700	85,124	122,824
TOTAL	44,300	106,124	150,424

If the plants operate to 90 per cent capacity and 28,800 tons of caustic soda are converted to soda ash according to the terms of the licence given to the Dhrangadhra Chemical Company for their Tuticorin plant, the quantity of caustic soda available for sale will be about 106,600 tons from the existing plants and capacity under implementation.

Additional capacity required.—In the light of the estimated requirements by 1960-61, it will be necessary for the caustic soda industry to expand by about 36,000 tons. It may not, however, be desirable to secure this additional capacity on the basis of the electrolytic process since such a step would considerably accentuate the already acute problem of chlorine disposal. The future line of development would seem to lie, therefore, in linking chemical caustic soda production with proposals for the expansion of soda ash production by the Standard Solvay Process. At any rate, in the absence of special justification such as inclusion of fully worked out schemes for chlorine utilisation, further capacity for electrolytic caustic soda should not be permitted to be brought into existence during the period of the Second Plan.

Raw materials.—On the basis of schemes approved for implementation, the mercury cells will account for about 80 per cent of the total capacity or 275 tons of caustic soda capacity per day. This will require import of about 500 tons of mercury. Graphite to the extent of 540 tons a year will also have to be imported.

The following table summarises the programme of development of the caustic soda industry:—

	1955-56 (Tons)	1960-61 (Tons)
Installed capacity	44,300	150,400
Actual production	36,000	135,400
Available for sale	36,000	106,600

D. MISCELLANEOUS CHEMICALS

The establishment of facilities for the production of miscellaneous chemicals depends on the availability in sufficient quantities and at reasonable prices, of basic materials like sulphur, sulphuric acid, caustic soda, soda ash, ammonia and alcohol, which are normally turned out on a large scale. Production of several of these materials, particularly in the field of organic chemicals, is also organised in modern times in by-product processing operations associated with petroleum refining and synthetic petrol production.

I. Review of progress in the First Plan

Targets.—Under the First Plan, no specific proposals were made regarding the development of miscellaneous chemicals primarily dependent on sulphuric acid, caustic soda and soda ash. The current levels of capacity and production were indicated and it was pointed out that facilities for additional production could be created without difficulty to meet requirements and hence no definite plans for development were necessary. On the other hand, certain important schemes already in execution or projected, were mentioned and a recommendation was made that facilities should be afforded for expanding capacity. Specific mention was made of the need for increasing the capacity for potassium chlorate from 2,200 tons to 3,800 tons per annum. Reference was also made to a gypsum-sulphur project with an annual capacity of 30,000 tons of sulphur.

The progress made during the First Plan by the industries specially mentioned is briefly outlined below:—

(a) *Calcium carbide.*—The plant for the manufacture of calcium carbide, which was being installed near Calcutta with an annual capacity of 3,000 tons went into production in November 1954 and had achieved its rated capacity by 1955. But the cost of production has been found to be very high and the quality of the product slightly inferior. The claim for assistance or protection to this industry has been referred to the Tariff Commission which has recently completed its enquiry. In the meantime to assist smooth offtake of the product a revenue import duty of 50 per cent and restrictions on use of imported carbide by actual users have been imposed. The two small experimental furnaces each with 1,000 tons capacity produced off and on some calcium carbide but these cannot be regarded hereafter as commercial units.

A survey report was prepared in 1955 by the Development Wing of the Ministry of Commerce and Industry regarding the scope for development of the calcium carbide industry, the economic size of plants, most favourable locations and possible lines of development. The conclusions reached were that a 20 tons per day furnace would be the minimum economic unit and that sites at Thana (Bombay) and Alwaye (Travancore-Cochin) offer the most favourable locations for future development. It was also suggested that this industry must be integrated with other basic chemical industries and that future developments should take into account production of organic chemicals and plastics based on acetylene gas. A target production of 24,000 tons was also recommended of which 9,000 tons would be required for heavy organic chemical industries.

Based on this Report, the Government have issued licences to the Indian Carbide Corporation at Thana, the Travancore-Cochin Chemicals at Alwaye and Travancore Electro-Chemical Industries, Kottayam, for a combined capacity of 23,200 tons by the end of 1955.

(*b*) *Ammonium chloride.*—The project of Fertilizers and Chemicals (FACT), Alwaye, for the production of ammonium chloride by direct reaction between ammonia and hydrochloric acid was completed and the plant went into production in November 1954. This unit has a rated capacity of 8,000 tons per annum of pure battery grade ammonium chloride. The production in 1955 was 1,683 tons and at present import of this material is considerably restricted as the price and quality of the indigenous product are satisfactory.

(*c*) *Sodium hydrosulphite.*—No progress was made on the schemes referred to in the volume "Programmes of Industrial Development, 1951-56". By the end of the First Plan licences for the manufacture of sodium hydrosulphite had been given to the following firms: –

Name of the firm	Process	Location	Annual capacity (Tons)
1. J. K. Chemicals	Amalgam	Bombay	1,400
2. Indian Electro-Chemicals	Zinc	Bombay	1,560
3. Sahu Bros. (Saurashtra)	Zinc	Bombay	2,400
4. Travancore-Cochin Chemicals	Amalgam	Alwaye	900
5. Morvi Chemical and Metallurgical Works	Zinc	Morvi	1,200
			7,460

The annual demand for this chemical is assessed at 3,800 tons. By the end of 1955 none of the above firms had taken effective steps for the establishment of this industry. It is expected that some of them will do so during 1956.

(*d*) *Manufacture of rare-earth compounds.*—The factory for the production of rare-earth compounds from the monazite sands of Travancore, which was under construction at the commencement of the First Plan, went into production in 1952 and achieved the rated capacity. The Government have also taken steps for the establishment of another plant at Trombay and this will also provide for further processing of the end-products.

(*e*) *Potassium chlorate.*—No additional capacity for the production of potassium chlorate came into existence during the First Plan with the result that the Western India Match Company is still the only major producer of this chemical in the country. They produce mainly for their own consumption. The Travancore Chemical Manufacturing Co. at Kundara, has stepped up production to 300 tons per annum. The balance of the requirements is met by imports. The Mettur Chemical and Industrial Corporation, Mettur Dam have been permitted as part of their expansion scheme, to produce 600 tons per annum by the chemical process using chlorine. Certain schemes by some match manufacturers of Sattur and Sivakasi (South India) for the manufacture of 1,000 tons per year of potassium chlorate for their own consumption are under examination.

(*f*) *Gypsum-sulphur project.*—As already explained in the section relating to sulphuric acid, the gypsum-sulphur project is still in the preliminary stages of examination.

(*g*) *Commercial explosives.*—The demand for commercial explosives (blasting explosives detonators and safety fuses) was of the order of Rs. 4·2 crores per annum at the commencement of the First Plan. In 1953, the Imperial Chemical Industries proposed a scheme for the manufacture of 5,000 short tons per annum of commercial explosives based on nitroglycerine and nitrocellulose as well as other explosives containing ammonium nitrate. The manufacture of some of the basic materials required for the production of these explosives, such as nitric acid, ammonium nitrate etc. as well as nitroglycerine, was also envisaged. The factory was proposed to be located at Gumia in Bihar State and the capital investment was estimated at about Rs. 4 crores. The Government agreed to participate in the share capital to the extent of Rs. 40 lakhs and further a loan of Rs. 1 crore from the Industrial Finance Corporation of India has also been approved. The remaining investment is to be made available by the Imperial Chemical Industries, by way of share capital and loans. The scheme and the pattern of financing were approved by the Government and preparatory work on the project, including acquisition of land, was taken in hand in 1954. A company by the name of the Indian Explosives Ltd. has been registered in India and the Government of India is represented on the Board of Directors. The estimated annual requirements of raw materials are as follows:—

Indigenous (Tons)		Imported (Tons)	
Ammonia	1,300	Sulphur	1,000
Case timber	1,300	Sodium nitrate	350
Refined glycerine	550	Nitrotoluene	180
Sodium chloride	300	Nitrocellulose	55
Manila paper	200	Acid Magenta Dye	1
Granite board	200		
Paraffin wax	150		
Alkali	150		

The Sindri Fertilizer Factory will supply the ammonia for this scheme. It is estimated that during the period of the First Plan, expenditure of about Rs. 1,00 lakhs will have been incurred on this important project.

Special mention may be made of some of the schemes for the production of new chemicals that were completed during the First Plan.

(*a*) *Acetic acid and acetone.*— The production of certain important organic chemicals on a large scale has been established during this period in conjunction with the manufacture of cellulose acetate filament at Sirpur Kagaznagar, Hyderabad State. Regular production of acetic acid commenced from 1953 and of acetone and acetic anhydride from 1954. The installed capacity and the actual production at the factory at Sirpur Kagaznagar are shown below:—

	Installed capacity (Tons)	Production (Tons)
Acetone:—		
1953	..	..
1954	240	150
1955	600	423
Acetic acid:—		
1953	720	275
1954	1,800	1,000
1955	3,180	2,375
Acetic anhydride:—		
1953	..	..
1954	1,140	300
1955	2,075	250

(*b*) *Hydrogen peroxide.*—This is an important auxiliary of the modern textile industry apart from its value as a pharmaceutical chemical. There were no schemes for its production under consideration at the commencement of the First Plan. Subsequently in 1953, a scheme was approved for the installation at Bombay of a hydrogen peroxide plant with an annual capacity of 720 tons by the National Peroxide with the technical and financial collaboration of Laporte Chemicals, England. The construction of the plant has been completed and the unit went into production in February 1956. The scheme involves an investment of Rs. 30 lakhs and is based on the electrolytic process as distinct from the chemical process starting from barium compounds. They are taking steps to double the production for export purposes. Another scheme with an annual capacity of 720 tons of peroxide, approved about the same time under the name of the Indian Electro-Chemicals, Bombay, is still in the preliminary stages of development.

(*c*) *Stable bleaching powder.*—The Mettur Chemicals and Industrial Corporation, Mettur Dam, completed the erection of equipment for the production of stable bleaching powder with the help of German consultants as permitted under the Industries (Development and Regulation) Act, 1951. This unit of 6,000 tons annual capacity went into regular production in November 1955, and has been producing at a rate of 12 tons per day since February 1956.

(*d*) *Miscellaneous inorganic heavy chemicals.*—The manufacture of certain inorganic heavy chemicals as by-products has been developed during the First Plan. Sodium thiosulphate is being obtained from the by-product liquor of sulphur black manufacture at Bulsar by the Atul Products. The manufacture of rayon filament by the vicose process has given rise to the production of sodium sulphate at the rayon factories. The capacity developed for these two chemicals from by-product recovery plants installed under the First Plan is placed at 500 tons per annum for sodium thiosulphate and 3,000 tons per annum for sodium sulphate.

Production of miscellaneous heavy chemicals.—Data relating to actual production of miscellaneous heavy chemicals (inorganic) during the period of the First Plan are given below:—

	1951	1952	1953	1954	1955
	(Tons)	(Tons)	(Tons)	(Tons)	(Tons)
Alum	2,460	4,765	5,065	3,600	4,370
Aluminium sulphate	19,350	16,229	22,805	25,000	27,690
Ferrous sulphate	612	365	503	581	515
Copper sulphate	505	388	518	844	1,045
Sodium thiosulphate	614	670	842	613	980
Sodium sulphite	204	220	246	192	269
Sodium sulphide	1,935	1,426	2,702	3,343	2,830
Bichromates	3,271	1,465	2,510	3,239	2,929
Potassium chlorate	1,593	1,872	1,935	1,518	2,135
Sodium bicarbonate	1,630	1,069	2,035	2,057	4,125
Zinc chloride	532	384	635	986	690
*Calcium chloride	959	193	733	524	786
Magnesium chloride	3,639	2,549	6,156	6,593	6,110
Calcium carbide	..	98	16	398	3,110
Ammonium chloride	..	..	.	..	1,683

*Tariff Commission Report, 1955.

Imports.—Import of heavy chemicals, whose production has been established in the country, has been progressively diminishing. On the other hand, imports of the products classed under 'other sorts of chemicals' in the data published in the Foreign Trade and Navigation Accounts of India show a steady rise in volume as well as value due primarily to the expansion of demand for intermediate chemicals in the manufacturing processes of several industries. Data relating to imports are given below:—

	1951-52	1952-53	1953-54	1954-55	1955-56 (April-Jan.)
	(Tons)	(Tons)	(Tons)	(Tons)	(Tons)
Alum	Negl.	Negl.	173	Negl.	..
Aluminium sulphate	107	231	500	270	289
Ferrous sulphate	Negl.	Negl.	125	50	..
Copper sulphate	2,111	832	913	849	453
Sodium thiosulphate	13	11	35	19	..
Sodium sulphide	2,240	633	1,045	903	248
Potassium bichromate	2	Negl.	Negl.	Negl.	Negl.
Sodium bichromate	Negl.	Negl.	Negl.	Negl.	50
Sodium bicarbonate	9,677	3,050	4,514	1,467	4,788
Potassium chlorate	1,412	915	800	941	777
Zinc chloride	246	247	48	Negl.	2
Calcium chloride	16	5	1	210	95
Sodium hydrosulphite	2,786	2,147	2,418	3,661	5,126
Calcium carbide	9,849	5,211	7,447	9,422	5,587
Other sorts of potassium compounds (lakhs of Rs.)	26·5	13	17	20	22.8
Other sorts of sodium compounds (lakhs of Rs.)	31	14	14	22.5	19.8
Other sorts of chemicals (lakhs of Rs.)	547	325	390	519	597
Bleaching powder	8,810	2,744	4,164	5,135	3,600
Ammonium chloride	5,325	2,377	4,035	3,938	2,739
Ammonia anhydrous	131	98	73	58	96
Ammonium carbonate and bicarbonate	2,373	94	625	1,485	1,052
Phosphorus	338	130	96	143	264
Acetic acid (pyroligneous)	1,333	882	1,067	1,559	876
Sulphur	37,281	73,941	43,914	75,574	76,869

Negl.—negligible.

Current consumption and estimated demand by 1960-61.—The consumption in 1954 and the anticipated requirements by 1960-61 for some of the major items have been estimated as under:—

	1954 (Tons)	1960-61 (Tons)
Chlorine and bleaching powder expressed as chlorine	17,155	47,150
Hydrochloric acid (33 per cent)	5,300	33,000
Aluminium sulphate and alums	28,600	50,000
Bleaching powder	4,800	15,000
Calcium carbide	8,000	24,000
Sodium hydrosulphite	3,000	4,000
Potassium chlorate	2,800	3,800
Hydrogen peroxide	500	1,200
Sodium bicarbonate	4,500 to 5,000	8,000
Sodium silicate	35,000	50,000
Carbon black	7,500	12,000
Ammonium chloride (industrial demand)	4,000	5,000
Sulphur	80,000	206,000

The consumption of chlorine and bleaching powder as well as that of hydrochloric acid as estimated above, do not include the requirements which might arise from the manufacture of dicalcium phosphate discussed under phosphatic fertilizers. The break-up of the estimated consumption of chlorine and bleaching powder and hydrochloric acid expressed in terms of chlorine is given below:—

	1954 (Tons)	1960-61 (Tons)
Bleached paper and pulp	7,200	21,600
Chemical pulp for rayon	Nil	5,000
DDT	Nil	6,000
Hydrochloric acid	4,500	8,700
Textiles	3,000	3,000
Water sterilisation	1,500	3,000
Dyestuffs and intermediates	..	2,000
Organic chlorine compounds like carbon tetrachloride, chlorinated rubber, chloroform, plastics, etc.	..	2,000
Laundries and *Dhobies*	500	2,000
Benzene Hexachloride (BHC)	80	2,000
Sanitation	300	1,000
Bromine	75	250
TOTAL	17,155	56,550

Break-up of consumption of hydrochloric acid (tons of 33 per cent acid)

	1954	1960-61
1. Ammonium chloride	Nil	10,000
2. Ossein	Nil	8,000
3. Rare-earth compounds	1,500	4,000
4. Dyestuffs	Nil	3,000
5. Caustic soda and soda ash factories	1,000	2,000
6. Zinc chloride	1,800	2,000
7. Inorganic chlorides	500	3,000
8. Miscellaneous	500	1,000
TOTAL	5,300	33,000

As regards aluminium sulphate and alums, the additional requirements are primarily connected with expansion of consumption in water purification and the paper industry. The expansion of demand for calcium carbide and sodium hydrosulphite is based on the following pattern of consumption in 1960-61.

(i) Calcium carbide

	1954 (Tons)	1960-61 (Tons)
Acetylene gas by gas manufacturers, users and industrial establishments	7,000	13,000
Acetylene gas for lighting purposes	1,000	2,000
Manufacture of polyvinyl chloride	Nil	3,000
Organic chemicals and plastics	Nil	2,000
Miscellaneous	Nil	4,000
TOTAL	8,000	24,000

(ii) Sodium hydrosulphite

Textile industry	2,000	2,500
Sugar industry	700	1,100
Leather and miscellaneous	300	400
TOTAL	3,000	4,000

Carbon black is required in the ink, paint and rubber manufactures industries and it is a material of considerable strategic importance. The break-up of requirements of sulphur have been discussed in the section dealing with sulphuric acid.

II. Programme of Development in the Second Plan

The programmes relating to some of the major products are discussed below:—

Calcium carbide.—With the implementation of the projects already licensed, the number of units that will be regularly in production will be four as against one at the commencement of the Second Plan. The corresponding installed capacities are about 26,200 tons and 3,000 tons respectively per annum on the basis of 300 working days. It does not seem necessary to envisage further expansion of this industry during the Second Plan, having regard to the level of requirements by 1960-61. But additional capacity for calcium carbide may have to be envisaged if acetylene is proposed to be made the basis of any new organic chemical products in preference to materials like alcohol. The picture relating to such developments is not completely clear at this stage.

The production in 1960-61 is estimated at 24,000 tons. The requirements of raw materials and power for achieving this production target are:—

Limestone	48,000	(Tons)
Charcoal/ coke	24,000	,,
Electrode material	8,000	,,
Electric power	100 million KW-hr.	

Sodium hydrosulphite.—Viewed against the requirements by 1960-61 estimated at 4,000 tons, the capacity approved for implementation under the First Plan seems adequate. It is therefore, felt that unless the progress on the implementation of the schemes is so unsatisfactory as not even to ensure a capacity of 5,000 tons per annum, it will not be necessary to allow any more new comers in the field. Commencement of production of sodium hydrosulphite in the country is envisaged in 1957-58.

Commercial explosives.—An investment of about Rs. 3 crores is envisaged on the project of the Indian Explosives during the Second Plan. In connection with the requirements of liquid ammonia for this project and certain other industries, the Railway Board have made arrangements for importing ammonia tank wagons. The factory is expected to go into production by 1958 and to ensure self-sufficiency at current levels of demand in a vital sector of the economy in subsequent years.

Carbon black.—On the basis of the requirements for rubber manufactures and certain other miscellaneous industries, amounting in all to about 13,000 tons, the National Industrial Development Corporation are processing a scheme for installing a carbon black plant with an annual capacity of 20 million lbs. (8,928 tons). In the development of the project, foreign technical collaboration is envisaged. The production of carbon black would be based on the use of creosote oil and petroleum residues in equal proportions. The plant is estimated to involve an outlay of Rs. 1·5 to 2 crores and to be in operation before the end of the Second Plan.

Sulphur.—A scheme for the production of sulphur from pyrites on the basis of the process operated by the Orkla Aktictsolag Lokken Verk, Norway, is under examination by the National Industrial Development Corporation. Provided pyrites of the required specifications is available—it should not contain a high proportion of arsenic—a recovery of 85 to 90 per cent of sulphur is expected as a possibility in this process. The requirements of major raw materials for a production of 33,000 tons of sulphur per annum in a plant of 100 tons of daily rated capacity for sulphur are estimated at 99,000 tons of pyrites, 11,000 tons of coke and 17,500 tons of quartz. The fixed investment on the plant is provisionally estimated at Rs. 50 lakhs. A final view on the project has to await the results of investigations into the occurrence and reserves of pyrites in the country, even if it is considered fit for implementation on other considerations.

25. COAL CARBONISATION AND PROCESSING OF BY-PRODUCTS

Coal is subjected to destructive distillation primarily for the production of hard and soft coke and town gas. Hard coke is an important raw material of the iron and steel, ferro-manganese, calcium carbide and synthetic ammonia industries, to mention only a few important ones. It is also essential for foundry operations in the engineering industries and for the production of chemical lime in the sugar and soda ash industries. Soft coke is an important domestic fuel. The carbonisation temperature is the principal factor distinguishing the manufacture of soft and hard cokes. Valuable by-products are obtained in the coal carbonisation process which serve directly or after some further processing as the primary raw materials of a large number of basic industries *e. g.* dyestuffs, explosives, pharmaceuticals, plastics. The gases from coke-ovens can be used for the manufacture of synthetic ammonia for the nitrogenous fertilizer industry.

In the following sections the coal carbonisation industry is treated under the following heads:—

A. High Temperature Carbonisation—Hard Coke
B. Low Temperature Carbonisation—Soft Coke
C. By-products recovery—processing of coke-oven gases and coal-tar.

A. HIGH TEMPERATURE CARBONISATION

I. Brief Survey of the Industry

Rated capacity and production.—Production of hard coke by high temperature carbonisation of coal was carried out before the commencement of the First Plan at the cokeries of the two primary steel producers (TISCO and IISCO) (almost entirely for consumption within the works), by four independent merchant cokeries in the private sector and by the Giridih Coke-ovens of the Central Government.

The major development in the public sector during the First Plan was the construction of a coke-oven plant at the Sindri Fertilizer Factory, which was commissioned and went into production by the end of August 1955. Previously the demand for coke in fertilizer production at Sindri has been met from supplies made available by the Indian Iron and Steel Company and the merchant cokeries. The Sindri coke-oven plant has a daily capacity for coke of 600 tons on 3 per cent moisture basis; it is also equipped to produce 1,800 gallons of crude benzol and 30 to 35 tons of coal-tar per day. The by-product recovery system attached to the coke-ovens is equipped for further rectification of crude benzol into benzene, toluene, xylene and solvent naphtha. The daily output capacity for these products corresponds to 740 gallons of benzene, 150 gallons of toluene, 54 gallons of xylene and 72 gallons of solvent naphtha. The coke-oven gas obtained as a by-product is estimated at 10 million cu. ft. per day. The Sindri coke-ovens involved an investment of about Rs. 2·81 crores.

Under adjustments to the First Plan, the West Bengal Government proposed in September 1953, the establishment of a coke-oven plant at Durgapur with a view to expanding industrial development and employment opportunities by provision of adequate supplies of coke to different industries already established or projected. The by-product recovery and processing plants, planned along with the coke-ovens, were regarded by the State Government as the nucleus of a coal-based chemical industry. Before taking a view on this project, the Planning Commission set up a Committee (the Coke-Oven Project Enquiry Committee) to assess the demand for coke over the period of the Second Plan, examine the anticipated availability of coke after taking into account the replacement and expansion programmes of existing producers and advise on the exact quantum of development needed for covering the deficit, the size of plant or plants to be established, their appropriate locations and in this connection to make an appraisal of the economics of the West Bengal Government's scheme. On the basis of the report submitted by the Committee in May 1955, the Durgapur scheme was accepted for implementation and by the end of the First Plan, preliminary steps thereon had been taken by the West Bengal Government.

The developments in the private sector were mainly, though not entirely, connected with the expansion and modernisation schemes of the iron and steel industry. One of the batteries of the coke-oven plant at the Tata Iron and Steel Works was rebuilt and came into operation again by December 1953. In connection with their 1953 Extension Programme, the Indian Iron and Steel Company have started preliminary work on the construction of additional coking capacity and during 1955-56 orders for plant and equipment were placed abroad. As regards the merchant cokeries, which compared to the coke-oven plants attached to the steel works and the Sindri Fertilizer Factory are considerably smaller and which have practically out-lived their life, work on their renovation was undertaken in 1954.

In 1955, The Bhowra Kankanee Collieries applied for permission to establish a coke-oven plant for the manufacture of 312,000 tons of coke per annum. The Government examined this application against the background of the Industrial Policy Resolution of 1948 in which it was laid down that the State would be exclusively responsible for the setting up of new units in the coal industry except where in the national interests, the State itself, finds it necessary to seek the co-operation of private enterprise. It was felt that there would be no scope for additional coke-oven capacity during the period of the Second Plan after taking into account the supplies from the Durgapur Coke-oven Project and proposals relating to the renovation of the Giridih coke-oven plant. The proposal was accordingly turned down.

The capacity for production of by-product of hard coke in the country is estimated to be as under at the commencement of the Second Plan :—

		Annual carbonisation capacity ('000 tons of coal)
Private sector :		
Steel plants	2,896	
Merchant cokeries	239	3,135
Public sector :		
Giridih coke-oven plant	56	
Sindri Fertiliser Factory	280	336
TOTAL		3,471

There is some capacity for the production of hard coke in bee-hive oven on a decentralised basis mainly in Bengal and Bihar.

Actual production of coke and despatches from the production units during the First Plan were as under:—

	Production ('000 tons)			Despatches ('000 tons)		
	Steel plants	Merchant cokeries	Bee-hive coke plants	Steel plants	Merchant cokeries	Bee-hive coke plants
1951	1,763	281	107	236	280	103
1952	1,656	277	111	139	268	121
1953	1,609	275	128	108	280	128
1954	1,948	218	157	67	227	166
1955*	2,101	250	251	87	249	231

*Includes production of 212,000 tons and despatch of 24,000 tons from the Sindri Fertilizer Factory.

Production of coke from the merchant cokeries declined considerably in 1954 and 1955 due to the break-down of one of the plants and the renovations undertaken by the other producers.

Imports and exports.—There are no imports of coke into India. As regards exports, which are allowed subject to a ceiling, the statistics, for the period of the First Plan are given below:—

	(Tons)
1950-51	8,814
1951-52	33,402
1952-53	58,691
1953-54	30,053
1954-55	35,171
1955-56 (April-December)	15,747

Consumption and requirements.—Hard coke of 40-25 mm. is consumed principally by the foundries and engineering workshops. Substantial new outlets for hard coke which developed in the period of the First Plan for the production of water gas in the manufacture of ammonia at the Sindri Fertilizer Factory and of pig iron by the electric smelting process at Bhadravati in Mysore State. The commencement of large-scale production of calcium carbide since early 1955 by a new plant at Calcutta has given rise to the need for low phosphorus coke. The other major consumers of coke are the soda ash factories, sugar mills and independent producers of chemical lime. Coke breeze is consumed in the production of producer gas in some of the engineering workshops and refractory works.

An assessment of the market demand for coke was made by the Coke-Oven Projects Enquiry Committee in 1955. According to the Committee, the demand in 1953, inclusive of exports of about 21,000 tons, was 484,000 tons. This figure did not include the requirements of the steel plants which, with the exception of the Mysore Iron and Steel Works, normally produce coke for their own requirements. It was estimated that the market demand towards the end of the First Plan would be of the same order, though in terms of quality requirements, the demand for special quality coke might be somewhat larger. The monthly industry-wise demand for coke in January 1955 (exclusive of exports) is reproduced below from the Report of the Coke-Oven Projects Enquiry Committee:—

	(Tons)
Railways	4,180
Municipalities and water-works	36
Electric supply companies	160
Primary producers of steel	3,400
Cement factories	400
Copper Corporation	18
Ordnance factories	725
Potteries	1,212
Refractories	100
Woollen mills	40
Cotton mills	800
Silk filatures	72
Jute mills	450
C Class States	9,944
Engineering and foundries	12,872

Paper mills	54
Enamel works	90
Food products	290
Leather works	36
Glass factories	360
Vanaspati products	450
Chemical works	1,063
Distilleries	18
Sugar mills	3,360
Re-rolling mills	246
Miscellaneous	1,347
Educational institutions	36
TOTAL	41,759

II. Programme of Development in the Second Plan

Estimated requirements.—The main consumption of coke of plus 40 mm. size will be linked with the expansion programme of the iron and steel industry. On the basis of production targets of 4·3 million tons of finished steel (5·6 million tons of ingots) and 700,000 tons of foundry grade pig iron for the market, the demand for sized hard coke, at the rate of 0·9 tons per ton of pig iron and steel ingot, would rise to 5·7 million tons by 1960-61. When full production of 6·0 million tons of steel ingots is achieved under these expansion schemes, the consumption of sized coke would go up to 6·0 million tons inclusive of the extra requirements for the additional pig iron produced for the market. These requirements will be met from the coke-oven plants attached to the steel works.

The requirements of the Sindri Fertilizer Factory will continue throughout the Second Plan at the level of about 185,000 tons per annum and will be met from the output of the factory's own coke-oven plants.

As regards the future requirements for the market, *i. e.*, other industrial consumers this subject was exhaustively gone into by the Coke-Oven Projects Enquiry Committee in 1955 on the basis of the targets for coke-consuming industries, then in the preliminary stages of formulation. The principal increases were visualised in the manufacture of ferro-manganese, low shaft blast furnace operation by the Kalinga Ferro-Alloys and expansion of pig iron production at the Mysore Iron and Steel Works, soda ash and sugar manufacture and large-scale operation by foundries. The Committee estimated that the total demand by 1960 "exclusive of the consumption of steel works and their subsidiaries and the Sindri Fertilizer Factory would amount to 875,000 tons". They stated, however, that these requirements might go down by about 70,000 tons, if certain projects made their own arrangements for coke internally, like the ferro-manganese scheme of TISCO, or changed to alternative raw materials like charcoal. Of this total demand, the requirements of *sized coke*, mainly over 2" but including a small fraction between 1" and 2", have been envisaged at 831,000 tons by 1960.

The break-up of consumption showed that about 100,000 to 110,000 tons would have to be of the special grade for production of ferro-manganese and ferro-alloys and 15,000 tons, conforming to more stringent specifications, for manufacture of calcium carbide, apart from the demands for special grade coke for malleable iron castings and special steel castings.

The targets visualised for some of the coke-consuming industries *e.g.*, ferro-manganese and calcium carbide, have subsequently undergone some upward revision. However, some of the ferro-manganese plants are planning to utilise charcoal in place of coke. Broadly speaking, these variations are not likely to affect considerably the estimate of the overall requirements of coke by 1960 made by the Coke-Oven Projects Enquiry Committee.

Schemes under implementation : Merchant cokeries.—The renovation programmes taken up by the merchant cokeries during the First Plan are expected to raise their total capacity for coke from 239,000 tons in 1955 to 307,000 tons by 1960. The actual financial investment on these programmes is not likely to exceed Rs. 25·0 lakhs during the Second Plan.

Durgapur Coke-Oven Plant.—Action on the Durgapur Coke-oven Project of the West Bengal Government was initiated in 1955-56 as explained earlier. The plant, along with the by-product recovery and the coal-tar distillation units, estimated by the Enquiry Committee to cost about Rs. 5,25 lakhs exclusive of preliminary expenses and working capital, is expected to go into full production by the middle of 1958. A provision of Rs. 3·5 crores is made for this project within the overall allocation of Rs. 6·5 crores made under the Second Plan of West Bengal for the Industrial Development Corporation which is being entrusted with the responsibility for developing this project. Arrangements have been made with suppliers of plant equipment for deferred payment of a part of the price of the machinery procured. The details of this major State undertaking under the Second Plan are given below:—

Carbonisation capacity	1,300 tons of throughput of coal and coke-breeze per day.
Production capacity for coke	930 tons of coke per day or 325,000 tons of coke per annum.
Capacity for sized coke plus 1"	292,930 tons per annum.
Ammonia	1,500 tons per annum.
Sulphuric acid	3,300 tons per annum.
Motor benzol available for sale	552,000 gallons per annum.
Benzene, toluene, solvent naphtha and xylene for sale	792,000 gallons per annum.
Still bottom oil	100,000 gallons per annum.
Road tar	9,286 tons per annum.
Naphthalene	682 tons per annum.
Wash oil	1,900 tons per annum.
Other tar-distillation products	3,743 tons per annum.
Coke-oven gas (surplus for sale 460 BTU per cubic feet)	2,863 million cubic feet per annum.

The coke-oven gas is expected to be utilised, in the first stage, as a fuel in the 60,000 KW power station, which it is proposed to establish in conjunction with the coke-oven plant. The West Bengal Government have also under consideration a plan for piping the gas to Chittaranjan and Calcutta for sale as industrial and domestic fuel; a final assessment of this proposition will be made in the light of the situation obtaining in 1958. The manufacturing conditions and techniques adopted by this coke-oven plant will be based on the results of pilot plant experiments of various coal blends carried out on a half-tone oven by the Fuel Research Institute. The efficiencies and yields claimed in this plant are expected in most cases to be substantially higher than those achieved so far in any of the coke-ovens or coal-tar distilleries operating in the country.

From the sale of the entire output of different products obtained from the operations of the plant, a gross return of Rs. 1,93 lakhs per annum is expected as against manufacturing charges, provision for depreciation and interest on working capital amounting to Rs. 1,58 lakhs.

Coke-ovens attached to the steel plants.—Large-scale production of coke to meet the requirements of this material for pig iron production in the iron and steel expansion programmes is planned in the public and private sectors. The surplus of coke likely to be available for the market from these plants is expected to be small. The carbonisation capacity of the cokeries attached to the steel works is expected to be about 9·8 million tons per annum by 1960-61 as against 2·9 million tons by the end of the First Plan. The break-up of this capacity is as follows:—

	Annual capacity (Coal carbonised—'000 tons)
Public sector:	
Hindustan Steel	1,600
Bhilai Steel plant	1,650
Durgapur Steel plant	1,825
Private sector:	
Tata Iron and Steel Co.	2,480
Indian Iron and Steel Co.	2,275
TOTAL	9,830

Inclusive of the capacity of other by-product coke-oven plants in the public and private sectors and of the plant attached to the Sindri Fertilizer Factory, the overall carbonisation capacity on the implementation of all these schemes will reach 10·91 million tons by the end of the Second Plan. The expansion of coking capacity in the public sector will show an increase of 1646 per cent over the level of 1955-56 as against about 61·5 per cent in the private sector. The share of the public sector in the overall capacity will be 54 per cent in 1960-61 as against about 10 per cent at the commencement of the Second Plan.

As regards investment, the outlay on the coke-ovens attached to the steel plants will be a part of the overall cost of each of the steel works and is provisionally estimated at about Rs. 50 crores in both the public and private sectors together.

The bee-hive coke-ovens operating on a small-scale basis are expected to carbonise about 160,000 tons of coal and make available nearly 120,000 tons of coke per annum during the Second Plan.

Raw materials.—The principal raw material for the production of hard coke is coal. The quality of hard coke required for particular uses will determine the characteristics of the coal to be carbonised and the preliminary treatment required for its beneficiation. The largest tonnage of coke produced is destined for consumption in the manufacture of pig iron and for use in foundries. For this purpose, the ash content in the coke has to be not more than 22 per cent and the mechanical strength in the Breslow test should be characterised by a yield of not less than 80 per cent of 40 mm. coke and not more than 8 to 9 per cent of 10 to 0 mm. coke. Since the ash content of the coke depends upon that of the coal used, the quality of the coal is of considerable importance. Reserves of high grade coal in India being limited, the plans for the production of coke in the steel plants envisage (i) the preliminary washing of inferior coals and (ii) the utilisation of blends of coal with a view to reducing the proportion of high grade metallurgical coal consumed. A coal washery with an hourly capacity of 360 tons is envisaged in connection with the Durgapur steel plant. Another washery is planned to be established in the same area *i. e.* the Bengal-Bihar area for treating Bokaro-Kargoli coals to be used in the coke-oven plants at Rourkela and Bhilai. The following are the quantities of coking coals, washed and raw, expected to be utilised in the steel projects in the public sector.

	Unit	Jharia	Bokaro	Korba	Kargali
Rourkela	'000 tons	400	..	..	1,200 (Washed)
Bhilai	"	897	538 (Washed)	347	..
Durgapur	"	472 (Washed)			
		1,353	..	..	..

The production of coke, coal-tar and by-product ammonia-ammonium sulphate at the three steel plants in the public sector, assuming full utilisation of the carbonisation capacity, will be as under:—

	Rourkela	Bhilai	Durgapur
Coke	1·045 million tons of which 880,000 tons of plus 40 mm. size.	1·286 million tons of which 1,018,000 tons of plus 40 mm. and above size.	1·314 million tons of which 1·14 million tons of plus 40 mm. and above size.
Coal-tar	52,000 tons	44,500 tons	52,013 tons
Ammonium sulphate or ammonia	3,600 tons ammonia liquor.	16,300 tons	19,017 tons.

Coke available for the market from the three steel plants will be about 120,000 tons; but it will be almost entirely in the size 0-25 mm. fit for being used only in producer gas generation, or for fuel purposes. The availability of sized coke from other sources as against requirements by 1960-61 estimated at 831,000 tons, is envisaged as under:—

	(Tons)
Four merchant plants in the private sector	269,500
Giridih plant (without renovation)	27,600
Indian Iron and Steel Co.	44,000
Durgapur Coke-oven plant	285,000
Bee-hive coke	105,000
TOTAL	731,100

From these data, it might appear that there is likely to be a shortage of about 100,000 tons of sized coke. In actual practice, this may not be so, having regard to the fact that the coke-ovens of the steel plants in the public sector will go into production much earlier than the other sections and can be expected to operate on full capacity. This will enable a certain stockpile of coke to be built up and thus the deficit will perhaps be met.

It is necessary to draw attention to the requirements of low phosphorus coke for the calcium carbide, ferro-manganese and malleable alloy castings industries. Whereas the Durgapur Coke-oven plant is planned to meet the requirements of coke for the ferro-manganese industry, the special quality required for the other two consumer industries is unlikely to be produced in any of the cokeries in existence or projected. It is against the background of this lacuna and the gap between supplies and requirements by 1960-61 discussed in the previous paragraph, that the Ministry of Production will have to examine the pending proposal for the renovation of the Giridih Coke-ovens since the Giridih coal provides the most suitable material for producing low phosphorus coke. If for any reason, the renovation of these ovens is deferred or given up, the required capacity, on the basis of the use of Giridih coal, might be planned at the coke-ovens of the Durgapur Steel plant.

The following table summarises the programme of development of the high temperature coal carbonisation industry*:—

	1955-56	1960-61
Number of companies	8	12
Annual capacity (Million tons of coal carbonised)	3·471	10·91
Actual production (Million tons of coke)	2·4	8·2
Sized coke only (Million tons)(40-25 mm.)	2·0	7·0

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*The data are exclusive of the coke-ovens of gas companies at Calcutta and Bombay whose capacity for coal carbonisation is 170,000 tons per annum. The coke from these plants being of poorer quality is mainly used for domestic purposes.

B. LOW TEMPERATURE CARBONISATION—SOFT COKE

I. Brief Survey of the Industry.

Rated capacity and production.—Though there have been a large number of small-scale producers of soft coke turning out as much as about 1·8 million tons in the Bengal-Bihar coalfields, there is so far no organised large-scale unit for producing soft coke in by-product coke-ovens. The manufacture of soft coke in large-scale by-product ovens has not attracted much interest in the private sector due to the low price obtainable for soft coke and the lack of an adequate market for the by-products in the absence of well-established dyestuffs, plastics and other organic chemical industries. The development of soft coke production is of considerable importance to the national economy owing to large-scale denudation of forests taking place in the country to meet domestic fuel requirements. In view of this, studies of low temperature carbonisation were initiated in recent years and a semi-commercial plant with a daily carbonisation capacity of 25 tons was established at the Central Laboratories, Hyderabad. Pilot-scale production of soft coke in this plant was commenced in 1954.

The production of soft coke in the last five years was as under:—

	('000 tons of soft coke)
1951	1,271
1952	1,302
1953	1,487
1954	1,549
1955	1,651

II. Programme of Development in the Second Plan.

A scheme for the establishment of a plant to produce soft coke is envisaged under the Second Plan as an integral part of the South Arcot Lignite Project. According to the preliminary report the plant is expected to provide for the preliminary drying and briquetting of 1·513 million tons of raw lignite per annum into 714,000 tons of briquettes. These briquettes are to be carbonised in six-twin-retort units designed to yield 423,000 tons of semi-coke per year (380,000 tons of good strong briquettes and 43,000 tons of coke breeze) with 12 per cent moisture. The operating results of the plant are expected to improve as a result of taking credit for 51,300 tons of tar, 1,984,000 gallons of motor spirit and 1,032 tons of phenol. The plant is expected to involve an outlay of Rs. 10·24 crores.

At the beginning of the Second Plan, the collection of the preliminary test data relating to the lignite mine development is in progress and the establishment of production facilities for soft coke is envisaged by 1960-61.

In view of transport difficulties and limitations of resources, the Second Plan does not make any further provision for low temperature carbonisation plants. In view of the paramount importance of the soft coke question, high priority has to be given to this industry in revisions of the Plan or under the Third Plan.

C. BY-PRODUCT RECOVERY AND PROCESSING

This section deals with the processing of crude benzol and coal-tar and the recovery of the various component fractions of these two materials.

I. Brief Survey of the Industry.

Rated capacity and production.—As already pointed out, the principal by-products of coke-oven operations are coal-tar, ammonia/ammonium sulphate and crude benzol apart from coke-oven gas. If the practice of recovering by-products were to be applied to the entire quantity of coal at present carbonised, the potential recovery of crude benzol at the hard coke plants would be about 7·0 million gallons at the rate of about 2 gallons per ton of coal carbonised. The present capacity for crude benzol recovery, on the other hand, is only about 2·4 million gallons, which indicates the scope for increased production. As regards the processing of crude benzol, during the Second World War, the Defence Department established plants at Jamshedpur and Burnpur for the recovery of toluene and detoluated benzol. The former was needed for meeting the expanded requirements of defence in the manufacture of trinitrotoluene and the latter was sold as motor fuel. The Burnpur plant was also equipped by them for the production of pure benzene. A plant for producing motor benzol is also attached to the Giridih Coke-ovens in the public sector. During the First Plan, a plant for the recovery and processing of benzol came into existence in conjunction with the coke-ovens at the Sindri Fertilizer Factory. The capacity for the different products obtainable from the by-products of coal carbonisation at the end of the First Plan is estimated to be as under:—

	Public Sector		Private Sector		Total	
	Number of plants	Annual capacity	Number of plants	Annual capacity	Number of plants	Annual capacity
Motor benzol (Gallons)	4	2,294,000	1	120,000	5	2,414,000
Benzene (Gallons)	2	510,000	1	28,500	3	538,500
Toluene (Gallons)	3	389,500	1	7,500	4	396,500
Coal-tar distillation (tons of tar distilled)	Nil	Nil	6	75,000	6	75,000

Though a wide range of products can be produced by appropriate modifications in the designs of distillation plants according to the pattern of end-products visualised, the production at the tar distillation plants is at present restricted mainly to creosote oil, naphthalene and road tar.

The quantities of different products obtained from crude benzol rectification and coal-tar distillation since 1951 have been as shown below:—

Production of coke-oven by-products and coal-tar distillation products

Item	Unit	1951	1952	1953	1954	1955
Motor benzol	'000 gallons	1,360	1,481	1,331	1,246	968
Benzene	,,	31·5	38·8	49·9	68·8	254·6
Toluene	,,	172·0	292·0	272·0	148·8	83·1
Solvent naphtha	,,	84·0	108·0	111·3	85·2	66·8
Coal-tar distilled	'000 tons	55·3	59·7	52·7	57·7	56·1
Creosote oil	'000 gallons	116·0	271·9	200·6	432·7	415·8
Road tar	'000 tons	37·5	41·5	38·5	40·0	40·7
Naphthalene	,,	765	670	588	671	790

There is a considerable gap between production and installed capacity in the case of benzene and toluene, due to the absence of industrial demands of a large order for the former and the fluctuating demands of the Defence departments for the latter from year to year. In the case of tar distillation products, difficulties in obtaining supplies of coal-tar and its high price impeded fuller utilisation of capacity. By the end of the First Plan, the position had improved to some extent in regard to benzene as a result of the demands arising from the expanding production of benzene hexachloride and DDT. Although production of crude tar has expanded, yet its availability for distillation has not improved substantially. Steel Companies are now burning more tar as liquid fuel for their steel furnaces.

Requirements.—The requirements of benzene, toluene and coal-tar distillation products are briefly discussed below:—

Benzene.—At the beginning of the First Plan, the demand for benzene was very small, save in the form of motor benzol for admixture with petrol. The rectification of benzol into benzene was redundant if it was only to be utilised as motor fuel. In subsequent years, industrial demands have developed with the establishment of plants for the manufacture of benzene hexachloride and D D T. The capacity of these plants in 1955-56 was 2,000 tons and 700 tons respectively per annum. From the data supplied by the industrial consumers, the requirements of benzene in 1955 have been estimated at about 1·0 million gallons. Actual consumption during the year is, however, placed at about 450,000 to 500,000 gallons.

Toluene.—The current requirements in the private sector are mainly for solvent purposes. The principal demand is in the Ordnance factories for production of military explosives. The demand of the civilian industries in 1955 is assessed at about 30,000 gallons.

As regards coal-tar distillation products the present consumption of road tar, heavy creosote oil, phenol and naphthalene are estimated at 50,000 tons, 2,000 tons, 200 tons and 600 tons respectively. The total current demand for road tar and bitumenous materials for road surfacing is estimated at 250,000 tons per annum to meet which about 150,000 tons of bitumen are imported.

II. Programme of Development in the Second Plan.

Estimated requirements.—At the present stage, assessment of the demands for various organic chemicals can only be in the nature of a first approximation subject to modification in the light of the ultimate manufacturing programmes that may be adopted for dyestuffs intermediates and drugs and certain other basic synthetic chemicals. According to the present assessment, requirements of benzene on the basis of the provisional targets of production for dyestuff intermediates, pharmaceuticals etc. envisaged for 1960-61, are estimated at 2·86 million gallons. The civilian industrial demand for toluene is placed at 500,000 gallons by 1960-61. Similarly, the demand for phenol and naphthalene are visualised at 1,200 tons and 3,000 tons. The demand for road tar and bitumen is anticipated to rise to 400,000 to 450,000 tons by 1960-61. The demand for heavy creosote oil is expected to rise in connection with the scheme for the manufacture of carbon black programmed by the National Industrial Development Corporation. The requirements of this project are estimated at 12,000 to 18,000 tons per annum. Inclusive of provision for some expansion of use in the treatment of timber, the overall demand for heavy creosote oil is placed at 17,000 to 20,000 tons by 1960-61.

Overall capacity on completion of schemes under implementation.—The total capacity that will be available for the rectification of benzol, the overall recovery of which is expected to reach

15·0 to 16·0 million gallons by 1960-61, and for tar distillation on the basis of schemes approved and/or under implementation is expected to be as under;—

	Benzene (Gallons)	Toluene (Gallons)
Existing—		
Bararee Coke Company	28,500	7,500
Indian Iron & Steel and Tata Iron & Steel	60,000	302,000
Sindri Fertilizers and Chemicals	450,000	87,500
New—		
Durgapur scheme of West Bengal	500,000	250,000
Bhilai Steel Plant	1,872,000	437,000
Durgapur Steel Plant	2,080,500	294,378
TOTAL	4,991,000	1,378,378

Tar distillation products

	Tar distilled	Crude phenols	Creosote oil (heavy)	Naphthalene
Existing capacity (Tons)	75,000	Nil	..	1,000
Bhilai Steel Plant (Tons)	45,000	800	3,400	1,700
Durgapur scheme of West Bengal (Tons)	17,500	Nil	..	682

It would seem that the requirements of all industries for the different products could be met by operating the production facilities outlined above. In the case of road tar, which is required to supplement the supplies of 150,000 tons bitumen in meeting the total demands of 400,000 to 450,000 tons by 1960-61 the availability from plants in existence and schemes referred to earlier is expected to be about 80,000 tons. This indicates that there would be a deficit of the order of 170,000 to 220,000 tons between supplies and estimated requirements. It should be possible to meet a part of this deficit by arranging for the creation of further coal-tar distillation capacity. The extent to which additional capacity for coal-tar distillation could be established would depend upon arrangements for reducing the consumption of coal-tar as fuel in Steel Works and prospects of increased consumption of the various coal-tar distillation products by different industries over the levels currently envisaged. It would seem to be necessary to envisage in the first instance the creation of an additional tar distillation capacity of about 30,000 tons per annum. In connection with further efforts to meet road tar requirements in full from within the country, the choice will lie between expansion of petroleum refining and coal-tar distillation. A final view as to the appropriate line of development, should be taken when the present tentative estimates of future demand for road tar by 1960-61 are corroborated by trends of consumption in the first two years of the Plan.

Preliminary consideration is being given to the question of providing benzol rectification facilities at Rourkela. Similar proposals have not yet received attention in connection with supplies of benzol which will be available from the low temperature carbonisation plant forming part of the South Arcot Lignite Project. The question of installing these facilities is essentially linked with the likelihood of demand for extra supplies of benzene and toluene on account of schemes still in the early stages of formulation. The installation of rectification facilities at Neyveli would have the advantage of eliminating long haulage of organic chemicals for consumer industries, like the manufacture of DDT, in South India. Consideration should be given to further expansion of rectification capacity at the appropriate stage when a clear picture of the additional requirements of industries and of Defence is available.

The following table summarises the programme of development of benzol rectification and coal-tar distillation during 1956-61:—

	1955-56	1960-61
I. Processing of crude benzol.—		
Number of plants	4	7
Annual installed capacity—		
(a) Benzene ('000 gallons)	538	4,991
(b) Toluene ('000 gallons)	396	1,378
Production—		
Benzene ('000 gallons)	254 (1955)	2,900
II. Coal-tar distillation.—		
Capacity ('000 tons of tar distilled)	75	180
Production—		
Road tar ('000 tons)	45	100

26. DYESTUFFS AND INTERMEDIATES

Though consumed in small quantities in comparison with other materials entering into industrial processes, dyestuffs are essential raw materials for several industries. They are required by the textile industry (cotton, silk, artificial silk and wool textiles) for producing fabrics of different shades and pleasing colours. In addition, the production of coloured paper and certain categories of finished paints and coloured cement products requires dyestuffs though in smaller quantities. Special types of dyestuffs are also consumed by food industries and in colorimetric and microscopic testing work. As the Dyestuffs Exploratory Committee of the Council of Scientific and Industrial Research pointed out in their Report, the dyestuffs industry acts as an important link in the chain of essential chemical industries such as the heavy chemicals industry, coal-tar industry, explosives, synthetic plastics and solvent industries. A country's chemical industry attains full development only when it has a well-established dyestuffs industry, drawing its raw materials from allied industries of indigenous origin.

Though synthetic dyes were first produced in the middle of the nineteenth century in the U. K. after the discovery of synthetic mauve by Sir William Perkin, the real development of this industry was the monopoly of Germany until the First World War. During the inter-war period (1919-1939) the manufacture of dyestuffs was established in the U. K., the United States, Japan, Switzerland, and France. Powerful undertakings like the I. G. Farben, the Imperial Chemical Industries, the American Cynamide Co., dominated the world markets on the eve of the outbreak of the Second World War. The position of the dyestuffs industry in different countries is shown in the following table:

Output of dyestuffs in the World and selected countries 1913-1949 ('000 *metric tons*)

Country	1913	1924	1938	1947	1949
World Total	162	154	..	..	188
U. S. A.	3	30	37	95	65
U. K.	5	15	21	34	20
France	7	17	9	16	12
Germany	135	70	61	8	18
Switzerland	10	13	7	15	10
Italy	..	5	11	9	9
U. S. S. R.	4	13	35	..	40
Japan	..	2	28	..	5

For fostering the establishment and development of this industry, the Governments of these countries rendered assistance in several ways. The Dyestuffs Importation Act of 1920 protected the British Dyestuffs Industry by allowing imports of only such dyes as could not be manufactured in the country at a reasonable price. The Act was extended in 1940 and is still in force. In the U.S.A. imports from certain countries are prohibited under Presidential Order and in Japan measures such as subsidies and import licensing, fostered the growth of this industry.

I. Brief Survey of the Industry.

Location, rated capacity and production.—The dyestuffs industry is of a comparatively recent origin in India and is still in the initial stages of its growth. A plan for this industry was formulated in the post-war years by the Dyestuffs Exploratory Committee appointed by the Council of Scientific and Industrial Research. The first indigenous enterprise in this line was that of the

Associated Research Laboratories, Bhatgar, which started production of the rapid fast type of dyes on a small scale in 1940. Three more factories came into existence for the production of rapid fast type of colours and developing salts before the commencement of the First Plan. During 1951-53 four other units went into production including the factory of the Atul Products located at Parnera near Bulsar, which, in September 1952, started the manufacture of azo dyes of the direct and acid types and of sulphur black. Between 1951 and 1955 production of dyestuffs has shown significant expansion and the foundations have been laid for further expansion through the extension of protection to this industry for a ten-year period ending December 31, 1964.

The capacity of the plants in existence for the production of different dyestuffs so far developed is expected to be as under at the beginning of the Second Plan.

Items	Annual capacity (Million lbs.)
(i) Azo dyes	2·6
(ii) Sulphur black	2·0
(iii) Fast colour salts	0·6
(iv) Stabilized azoics	
(a) Rapid fast type	0·65
(b) Rapidogen type	0·33
(v) Solubilized vats	0·23
(vi) Oil soluble dyes	0·19
	6·60

The names of the units in existence and the types of dyestuffs produced by them are as under:—

1. Atul Products, Bulsar	(i) Azo dyes. (ii) Stabilized azoics— Rapid fast type (iii) Fast colour salts (iv) Sulphur black.
2. Arlabs, Bhatgar (Poona)	(i) Solubilized vats (ii) Stabilized azoics— (a) Rapid fast type (b) Rapidogens (iii) Fast colour salts.
3. National Chemical Industries, Delhi	(i) Solubilized vats (ii) Stabilized azoics— (a) Rapid fast type (b) Rapidogens.
4. Hickson & Patel, Bombay	Sulphur black.
5. S. K. Kabbur, Bombay	(i) Oil soluble dyes. (ii) Azo dyes.

6. India Chemical Industries, Amritsar	(i) Azo dyes (ii) Oil soluble dyes.
7. India Dye-Chem Industries, Delhi	Oil soluble dyes.
8. Shree Dyes and Chemicals, Bombay	(i) Fast colour salts (ii) Stabilized azoics—Rapid fast type.
9. National Dyes, Bombay	(i) Fast colour salts (ii) Stabilized azoics—Rapidogen types.
10. Durga Laboratories, Bombay	(i) Stabilized azoics—Rapid fast type.
11. International Research Laboratories, Bombay	(i) Fast colour salts (ii) Stabilized azoics—Rapid fast type.

The production of dyestuffs is at present based upon the utilisation of imported intermediates and penultimate products so that the net gain by way of saving in foreign exchange is only of the order of about 20 to 25 per cent of the value of the output. Nevertheless, this industry has contributed to some reduction in the requirements of foreign exchange on the basis of the progressive increase in production achieved during the period of the First Plan, which is indicated as under:—

Production of dyestuffs (in lbs.)

	Sulphur black	Azo dyes	Stabilized azoics	Solubilized vats	Developing salts
1951	..	..	32,166	5,894	41,000
1952	14,573	66,965	56,755	7,276	20,332
1953	599,748	577,470	196,200	64,137	134,146
1954	1,000,000	1,633,684	465,000	124,347	354,300
1955	1,697,000	1,589,431	402,810	94,216	320,570

Foreign collaboration and technical assistance.—The Atul Products have developed the production of dyestuffs in the country on the basis of collaboration with the Calco Division of the American Cynamide Company, U. S. A., and the Casellshaft Fur Chemischo Industries Basel (CIBA) of Switzerland. Technical assistance from the former was utilized for the development of the production of azo dyes and sulphur black. For the production of some azo dyes of the direct group, which was established in 1955, the Atul Products entered into a technical assistance agreement with CIBA. Another agreement with CIBA covered the production of stabilized azoics known in the market by the name of Cibagens.

As regards the manufacture of sulphur black by the Hickson & Patel, technical assistance was secured by the company from Hickson & Welch of the U. K.

Capital and labour.—It is difficult to indicate the exact investment in the dyestuffs industry in view of the fact that the service facilities like water and power supply are common for the dyestuffs and pharmaceutical plants in the case of the Atul Products, who are practically the only large-scale producers of dyestuffs in the country. The value of fixed assets of this company rose from Rs. 0·30 crore at the end of December 1950 to Rs. 1·82 crores by the end of 1954. The overall fixed capital investment is estimated at about Rs. 2·5 crores in this industry at the end of the First Plan, inclusive of expenditure on projects under implementation. The dyestuffs plants are estimated to provide employment currently to about 800 persons.

Imports.—Imports of dyestuffs in the last five years were of the order of Rs. 15·0 crores per annum. It is difficult to correlate the volume of imports with the estimated quantities of dyes consumed because the quantities indicated in import statistics are based on varying commercial strengths of dyestuffs. This deviation is particularly striking in the case of vat dyes where consumption figures are expressed in terms of single standard strength 100. The quantity and value of imports of different dyestuffs since 1951-52 is indicated in the statement below.

IMPORT OF DYES INTO INDIA

(Quantity in '000 lbs. and value in Rs. lakhs)

Item	1951-52		1952-53		1953-54		1954-55		1955-56 (April-Jan.)	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Alizarin dyes, dry and moist	218	4·1	2	0·09	101	1·9	583	11·9	151	4·63
Congo red . .	1,178	43·8	393	10·2	315	8·4	316	10·1	126	4·49
Coupling dyes of the naphthol group										
Naphthols . .	1,487	1,53·5	969	90·4	2,131	184·4	2,829	2,22·9	2,134	1,35·00
Rapid fast colours (Rapid salts)	254	38·9	254	40·1	217	34·4	92	13·2	24	2·39
Bases . . .	988	99·6	660	55·8	1,455	1,25·7	2,387	1,90·3	1,534	1,09·22
Other salts . .	928	50·1	422	20·8	841	43·2	196	5·1	11	0·60
Vats										
Indigo . . .	661	35·2	347	18·4	974	54·8	701	36·7	332	18·13
Carbazole blue .	40	5·8	4	0·4	20	2·2	17	2·0	16	2·21
Other sorts										
Paste . . .	343	44·3	79	10·0	341	44·4	600	68·9	436	43·99
Powder . .	1,192	5,46·4	671	3,03·6	1,565	6,63·8	1,775	7,07·2	1,403	5,11·21
Sulphur black .	3,067	72·7	1,147	24·0	3,478	66·5	1,092	30·0	546	13·56
Metanil yellow .	264	11·0	118	5·1	397	15·4	423	14·7	601	20·38
Auramine of concentration of 15 per cent and less	39	3·0	..	..	6	0·4	10	0·7	..	..
Rhodamine (cathamine) of concentration of 15 per cent and less	18	3·0	..	..	8	1·1	12	1·4	1	0·12
Aniline salt . .	628	8·6	11	0·1	285	3·4	449	5·8	351	3·05
Others . .	4,035	3,07·3	2,134	1,71·8	3,552	2,95·8	3,801	3,22·5	3,157	2,80·22
TOTAL .	15,340	14,27·3	7,211	750·8	15,686	15,45·8	15,283	16,43·4	10,823	11,49·20

Problems of the industry.—(1) The domestic manufacturers of dyestuffs had to face severe competition from imports on account of the relatively low import duties. Further, the heavy duty of 37 per cent *ad valorem* on imports of raw materials and intermediates going into the manufacture of indigenous dyestuffs pushed up the costs to a higher level than they would have reached if the rates for dyestuffs and intermediates had been identical.

(2) The instability of import policy and the difficulty in achieving flexibility of production to suit market conditions and demand on account of half-yearly issue of licences for imports also added to the difficulties of the indigenous producers.

(3) The indigenous industry faced a difficult situation on account of imports in excess of requirements and competition from well established and powerful importing houses.

All these problems, which impeded the development of the dyestuffs industry, were reviewed by the Tariff Commission and appropriate measures were taken by the Government on the basis of the Commission's recommendations early in 1955. The duties on rapid fast colours, rapidogens and rapidazols, fast colour salts and solubilized vats were fixed at 12 per cent *ad valorem* and those on acid azo dyes, direct azo dyes and sulphur black at 20 per cent *ad valorem*. The standard rate of duty on the following specific intermediates entering into the manufacture of dyestuffs produced in the country was reduced to 10 per cent *ad valorem* up to December 31, 1955 to be reviewed thereafter.

(a) Para-nitraniline
(b) Amino azo benzene hydrochloride
(c) Sulphanilic acid
(d) Benzidine di-hydrochloride
(e) Sodium naphthionate and naphthionic acid
(f) Nevile and Winther's acid
(g) Rhoduline acid
(h) J acid urea
(i) Para-amino acetanilide
(j) Dinitro-chlorobenzene
(k) Meta-phenylene diamine
(l) Gamma acid
(m) Metatoluylene diamine
(n) Chicago acid
(o) H. Acid
(p) G. salt
(q) Laurent acid

II. Programme of Development in the Second Plan

Estimated requirements.—The question of domestic demand for dyestuffs was gone into very closely by the Tariff Commission in the course of its enquiry into the industry in 1953-54. Subsequently, the Development Wing of the Ministry of Commerce and Industry gave further thought to this subject in connection with their studies of various aspects of this industry including a rational pattern of production to be brought into existence in the coming years. The following is the assessment of the present requirements of different kinds of dyestuffs according to the Development Wing.

	Demand 1955 (Lbs.)
1. *Acid dyes.*—	
Yellow, orange, red, scarlet and black	600,000
2. *Direct dyes.*—	
Red, including congo red	800,000
All other direct dyes	1,200,000
3. Basic dyes	750,000
4. *Azoic dyes.*—	
(a) Naphthols	1,300,000
(b) Fast colour bases	1,300,000
(c) Fast colour salts	900,000
(d) Rapid fast colours and rapidogens	400,000
5. *Vat dyes.*—	
(a) Indigo	500,000
(b) Powders & pastes:	
(i) Vat greens (single standard strength '100')	5,500,000
(ii) Other vats, including blues (single standard strength '100')	9,000,000
6. *Sulphur dyes.*—	
Black	2,800,000
Others	500,000
7. Solubilized vats	250,000
8. Aniline salt	400,000
9. Other unclassified dyes	500,000
TOTAL	26,700,000

It is difficult to make a firm forecast of the demand for dyes by 1960-61. The following major targets for textile industries are relevant to a consideration of this subject:—

	Production (million yards)	
	1955-56	1960-61
Cotton textiles (cloth)	6,600	8,500
Rayon fabrics	250	350
Woollen cloth	14	20

The increase in production in the cotton textile sector is of the order of 30 per cent. In the other sectors, which are relatively less important from the point of view of consumption of dyestuffs, the increase is about 40 to 45 per cent. It cannot, however, be postulated straightaway that the consumption of dyestuffs will show a proportionate increase because (a) the pattern of production of textiles in terms of break-up of different varieties is not easy to forecast and (b) there is a constant

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effort through research to discover and introduce new dyes and formulations which achieve the same tinctorial effect with the use of smaller quantities of colouring materials. It is provisionally visualised that the consumption of dyes might go up to about 32 million lbs. per annum by the end of the Second Plan.

Schemes under implementation.—The programme of development for dyestuffs and intermediates is discussed separately in the following paragraphs.

A. Dyestuffs

The schemes approved for implementation by the Government which are discussed individually below will lead to the creation of the following additional capacity :—

	(lbs.)
Naphthols (azoics)	2,016,000
Sulphur black	1,000,000
Vat dyes (single standard strength '100')	10,000,000
Fast colour bases	672,000
Stabilised azoics	224,000
Optical bleaching agents	262,000
	14,174,000

Naphthols, fast colour bases, etc.—The Atul Products, and the Amritlal and Co. (Amar Dye-Chem) have been permitted to develop the production of naphthols. The former will undertake their production in collaboration with the American Cynamide Company of the U.S.A. and the latter with the Hilton Davis Company of U. S. A. Their aggregate capacity for naphthols will be 2,016,000 lbs. per annum, and the items of production are expected to be as under :—

Naphthol AS
,, AS:BS
,, AS:SW
,, AS:BO
,, AS:TR
,, AS:S
,, AS:D
,, AS:OL

To start with, production will be based on imported BON acid and, at a later stage, the acid will also be indigenously produced from beta-naphthol.

Amar Dye-Chem will also be producing fast colour bases, *viz.*, Scarlet R, Red B, Bordeaux GP, Blue B, Garnet B, and Scarlet B, stabilised azoics (spectrolens) and optical bleaching agents. The last named product will also be produced by the Sarabhai-Geigy. Production of the above mentioned dyestuffs is expected to be established during 1956.

Sulphur Black.—The expansion of scheme of the Atul Products for increasing the capacity for sulphur black by one million pounds will materialise in 1956. The overall capacity for the production of this dyestuff will, as a result, go up to 3 million lbs. which corresponds to the order of requirements for this material.

Vat dyes.—This is an important group of dyestuffs consumed in the country. On the basis of schemes approved during the First Plan, production of some of these is expected to be developed by two firms, *viz.*, Indian Dyestuff Industries at Kalyan and Atic Industries at Bulsar. Indian

Dyestuff Industries have been granted a licence under the Industries (Development and Regulation) Act for the production of 8 Vat Dyes (Vat Jade Green FFB, Vat Black BB, Vat Dark Blue BO, Vat Blue BC, Vat Blue R/RSN, Vat Blue 2B, Vat Violet RR, Vat Violet 4R) within an annual capacity of about 6 million lbs. (single standard strength '100'). The Atic Industries (jointly sponsored by the Atul Products and the Imperial Chemical Industries, U.K. on the basis of 50-50 partnership between the two firms) were permitted in June 1954 to undertake the manufacture of Vat Jade Greens with a capacity of 4 million lbs. (single standard strength '100') per annum. The production of vat dyes is expected to be established in 1956.

The investment on plant and machinery for the Atic project, which was estimated at Rs. 25 lakhs, will have been incurred almost entirely during the First Plan. Similarly the expenditure on the project of the Indian Dyestuff Industries, which is estimated at Rs. 15 lakhs, will have been incurred by April 1956.

Targets of capacity and production.—Near self-sufficiency may be taken as the basic objective in formulating the targets for the production of dyestuffs under the Second Plan. For achieving this objective, it will be necessary to direct future developments to cover the following lines of production:—

(a) *Azo dyes.*—The capacity established and under implementation is adequate for meeting the demand for ordinary types of azo dyes. Production, however, of the following categories of dyestuffs has to be developed:

(i) Cyanurated azo dyes (chlorantine types).
(ii) Urea derivatives of monoazo and disazo dyestuffs (Sirius supra type).
(iii) Mordant azo dyes.
(iv) Metallised acid dyes.

(b) *Basic dyes.*—There is no capacity established or under implementation for this category of dyestuff production. Capacity for basic dyes has to be established up to 750,000 lbs. per annum.

(c) *Naphthols.*—Capacity approved for establishment up till the end of the First Plan does not cover the entire range of naphthols. Production of naphthols AS-RL; AS-LT; AS-BG; AS-E; AS-BR; AS-GR; AS-LB; AS-SG; AS-SR; will need to be fostered in this connection.

(d) *Indigo.*—There is no capacity established or under implementation for indigo, though current requirements are about 500,000 lbs. per annum. This gap in the structure of the dyestuffs industry should be covered before 1960-61.

(e) *Vat dyes.*—Future expansion will have to provide facilities for the production of vat yellows, vat browns, vat oranges and carbazole blue. For this purpose, additional capacity of the order of 2 to 2·5 million lbs. for new vat dyestuffs, not so far programmed for production, has to be brought into existence during the Second Plan.

(f) *Sulphur dyes.*—Adequate provision for the production of sulphur black has already been made. Further expansion of this section of the industry will have to be directed to securing facilities for the production of sulphur brown, sulphur blue, sulphur green and Indo-carbon CL.

The overall capacity and production targets for the manufacture of dyestuffs are envisaged at 27 million lbs. and 22 million lbs. respectively by 1960-61.

B. INTERMEDIATES FOR THE DYESTUFFS INDUSTRY

The development of the dyestuffs industry requires horizontal as well as vertical growth. The former is needed for increasing the range of output of dyes so that a customer like the cotton textile industry can have the satisfaction of obtaining supplies of as many shades of colour as possible without having to depend on foreign sources. Vertical growth by establishing production on the basis of primary raw materials instead of imported penultimate products increases the value added by the manufacturing process. The gain by shift in imports from ultimate dyestuffs to penultimate and intermediate products is not significant from the point of view of savings in foreign exchange, nor does it lend stability to the domestic industry since, in emergencies, supplies of intermediates might be difficult to obtain. In the circumstances and considering the fact that the dyestuffs industry has reached a satisfactory level of development under the First Plan and has to aim at a production target indicated earlier, the establishment of facilities for manufacturing intermediates has to be assigned a high priority.

In accordance with one of the recommendations made by the Tariff Commission in 1954, which was accepted by the Government, the dyestuff manufacturers have submitted to the Ministry of Commerce and Industry (Development Wing) their future programmes for the manufacture of dyestuffs, as well as intermediates. In view of the importance of ensuring manufacture of intermediates along rational lines, the Government invited a team of experts from Messrs. Montecatni (A. C. N. A.), Italy, to undertake a survey and prepare a report covering the different major aspects of development. Similar surveys have been undertaken on their own by the West German Government and by the Imperial Chemical Industries. The National Industrial Development Corporation have taken up the subject of intermediates for processing, with a view later to fostering their manufacture.

The quantities of various intermediates that should be manufactured in the country will be decided when survey reports become available. The following, however, are the important intermediates under different groups required by the dyestuffs industry. Some of these products are used in other industries also such as the pharmaceutical, plastic, rubber and chemical industries.

(*Chlorobenzene group*)
Chlorobenzene
o-Nitrochlorobenzene
p-Nitrochlorobenzene
Dinitrochlorobenzene
Dinitroanisole
p-Nitroanisole
o-Nitroanisole
Dianisidine
o-Anisidine
Phenol
p-Anisidine
Salicylic acid

(*Toluene group*)
o-Nitrotoluene
p-Nitrotoluene
o-Tolidine
o-Toluidine
p-Toluidine
Dinitrotoluene
m-Toluylene diamine

(*Nitrobenzene group*)
Dinitrobenzene
m-Phenylene diamine
Nitrobenzene
Metanilic acid
Benzidine
Aniline
Dimethylaniline
Sulphanilic acid
p-Amino azobenzene
Michler's ketone
Diphenylamine

(*Naphthalene group*)
Beta-naphthol
Beta-hydroxynaphthoic acid
Alpha-naphthylamine
Naphthionic acid
Novile and Winther's acid
Beta-Naphthylamine
Phthalic anhydride
Anthraquinone
Benzanthrone

For ensuring supplies of raw materials for the production of intermediates, facilities are being planned for recovery of by-products of coal carbonisation which is discussed under the programme relating to coal carbonisation. As regards other heavy chemicals like oleum, nitric acid, ammonia, chlorine, etc., supplies are expected to be available in some cases from outside sources and in others from plants that may be established as integral parts of units for intermediates manufacture. The development of production facilities for intermediates can be based on more than one pattern. The plants can be adjuncts to dyestuff units or centralised on the basis of the overall demand from different units/consumer industries. In cases where the overall requirements are too small for an economic unit, it may be possible to undertake production by setting up a unit and operation facilities of optimum sizes but utilising them for manufacturing more than one product. These are some of the issues on which decisions will have to be taken in the light of the advice given by the expert teams.

Investment.—In making an assessment of the investment needs under the Second Plan, it has to be noted that very little expenditure will remain to be incurred on account of schemes already under implementation and expected to go into production in 1956. The demands for investment are expected to be mainly for stepping up the capacity from about 18·0 million lbs. of dyestuffs to 27·0 million lbs. and for developing facilities for production of the bulk of the intermediates. An overall investment of Rs. 8·7 crores is envisaged in the dyestuffs and intermediates industry over the five-year period. A part of this investment will take place under the aegis of the National Industrial Development Corporation.

Miscellaneous.—(1) Early action is required to be taken on the recommendations of the Tariff Commission in regard to arrangements for the selection of samples of dyes by an independent agency and for the testing of their quality by a well-equipped institution.

(2) The Indian Standards Institution should, in consultation with the producers and importers of dyes, try to evolve standards of strength with reference to which the actual strength of indigenous or imported dyes can be measured.

27. DRUGS AND PHARMACEUTICALS

I. Review of Progress in the First Plan

Targets.—Drugs and pharmaceuticals cover a large variety of products ranging from simple extracts of vegetable drugs and glandular preparations to highly complex synthetic drugs and antibiotics. As there was considerable surplus capacity in existence for many of the simpler types of pharmaceutical preparations like tinctures, extracts, galenicals, etc., the First Plan did not lay down any specific targets for these items, but in regard to the more important drugs, the following targets were set for 1955-56 :—

1. Penicillin	4·8 million mega units
2. Sulpha drugs	400,000 lbs.
3. DDT	700 tons
4. Benzene hexachloride	500 tons
5. Quinine	150,000 lbs.

The actual progress made in the achievement of these targets and other salient developments during the First Plan are discussed in the following paragraphs :—

Capacity and production.—1. *Antibiotics.*—In the field of antibiotics, the most important step taken has been the establishment of a penicillin factory in the public sector. The Hindustan Antibiotics for which substantial assistance was received from the United Nations International Children's Emergency Fund (UNICEF) and the World Health Organisation (WHO) (and later from UNTAA) went into trial production in March 1955. Regular production of penicillin was commenced from August 1955. The factory which is located at Pimpri near Poona was planned to produce 3·6 million to 9 million mega units of penicillin per annum. It has already achieved the production rate of 12·5 million mega units and by the end of 1956 is expected to attain a capacity of 15 million mega units by the use of improved strains of penicillin moulds and improved operational techniques. The production of this factory in 1955-56 is estimated at 6·6 million mega units which is substantially higher than the target visualised in the Plan.

The manufacture of certain other antibiotics has also been taken up in the country. Chloramphenicol (chloromycetin) is being produced by the Parke Davis and Co. from the penultimate levobase which is imported. Their plant has a capacity of 3,600 kgs. per annum which is proposed to be expanded to 10,000 kgs. Steps are being taken to produce this drug from the next lower intermediate, nitrobase.

Chlortetracyclin (aureomycin) is produced by the Atul Products from imported crude chlortetracyclin. They have also taken up the manufacture of tetracyclin (achromycin) starting from chlortetracyclin. They have a capacity for the manufacture of 9,600 kgs. of aureomycin and 2,400 kgs. of achromycin.

With the materialisation of these schemes, the annual capacity for different antibiotics at the end of the First Plan is as follows :—

Penicillin	12·5 million mega units
Chloramphenicol (chloromycetin, syntomycetin, etc.)	3,600 kgs.
Tetracyclins—	
1. Chlortetracyclin	9,600 kgs.
2. Tetracyclin	2,400 kgs.

Production and imports of antibiotics in recent years are indicated below :—

	1952		1953		1954		1955	
	Production	Imports	Production	Imports	Production	Imports	Production	Imports
Penicillin (Million mega units)	..	12·63	..	25·61	..	23·72	4·0	35·3
Streptomycin (kgs.)	..	9,061	..	9,418	..	12,697	..	21,100
Chloramphenicol (kgs.)		1,800	..	1,882	700	3,483	1,500	2,200
Tetracyclin (kgs.)	..	442·9	535	339·5	697	680·7	333	130

2. *Sulpha drugs.*—A number of sulpha drugs are at present produced in the country, some of them from basic raw materials and others from imported penultimate products. The May and Baker and Atul Products who had programmes for the manufacture of sulpha drugs at the beginning of the Plan period have set up plants for their production. Both firms produce the drug from penultimate products which are imported. The Haffkine Institute, Bombay have continued the production of sulpha drugs starting from intermediates on their pilot plant installed already. The Biochemical and Synthetic Products and Ciba Pharma are two other manufacturers who have taken up the production of sulpha drugs from basic raw materials. Their plants are under construction. In addition, 7 others also produce sulpha drugs on a small scale. They are stated to have a combined capacity of 22,200 kgs. per annum although the actual production has been far below this capacity.

The present capacity for different sulpha drugs is as follows :—

	Number of units	Annual capacity (kgs.)
1. Sulphapyridine, sulphathiozole, sulphadiazine, etc.	3	363,300
2. Sulphacetamide, sulphonamide, etc.	7	22,200
3. Sulphaguanidine, sulphamethazine, etc.	1	40,500
4. Sulphasomidine	1	23,900
TOTAL	12	449,900

Imports and production of sulpha drugs during recent years have been as follows —

	Production	Imports	Total availability
	(Kgs.)	(Kgs.)	(Kgs.)
1952	47,074	258,219	305,293
1953	34,913	229,066	263,979
1954	52,532	456,132	508,664
1955	80,200	379,000	459,200

3. *Anti-T. B. drugs.*—Among the new drugs recently developed for the treatment of tuberculosis are para-amino salicylic-acid (PAS) and Isonicotinichydrazide (INH). Certain proposal for the manufacture of PAS were under consideration at the beginning of the First Plan. Its m-anufacture has now been taken up by the Biochemical and Synthetic Products whose plant is nearing completion. To begin with it will be produced from the imported intermediate maminophenol. This plant has a capacity of 36,320 kgs. The manufacture of INH has also been taken up by a few firms from imported raw materials, gammapicoline and urea. The present capacity for the manufacture of INH is estimated at 12,090 kgs. So far, regular production has been achieved by only one of the units and the output of others has been very erratic. The claim for protection for INH manufacture has recently been enquired into by the Tariff Commission. Their recommendations are awaited.

Production and imports of PAS and INH in recent years have been as follows :—

	PAS (kgs.)		INH(lbs.)	
	Production	Imports	Production	Imports
1952	..	42,360	282	..
1953	..	76,320	786	6,020
1954	..	72,820	343	6,660
1955	..	118,800	2,700	9,500

4. *Anti-leprosy Drugs.*—Among the synthetic anti-leprosy drugs, DDS and its derivatives (Sulphones) are at present produced by two manufacturers from basic raw materials. They have a total capacity for 2,920 kgs. of DDS and its derivatives. Production is at present carried out mostly on a semi-commercial scale. Full-scale production has yet to be achieved. Production and imports of sulphones and its derivatives have been as follows :—

	Production	Imports	Availability
	(kgs.)	(kgs.)	(kgs.)
1952	787	N.A.	N.A.
1953	1,038	561	1,599
1954	1,642	1,068	2,710
1955	2,610	4,500	7,110

5. *Anti-malarials.*—Quinine is still by far the best known and most extensively used anti-malarial drug. It has been produced for a long time in India in the factories established by the West Bengal and Madras Governments. During the First Plan period, the Madras Government expanded facilities for quinine production with the establishment of a new factory at Anamalai with a capacity of 80,000 to 100,000 lbs. of quinine salt.

During recent years there has been a fall in the offtake of quinine partly on account of fall in the incidence of malaria and partly on account of the discovery of a number of synthetic anti-malarials. Some of these synthetic anti-malarials like chloroquin and its salts are produced in the country. The production of proguanil hydrochloride has not yet been undertaken. The demand for all types of anti-malarials is likely to show a downward trend in future years with the extension and success of anti-malarial campaigns aiming at the destruction of mosquitoes by spraying insecticides etc.

Three manufacturers have set up plants for the production of chloroquin and its compound from imported intermediates. Although they are estimated to have a total capacity of 1,890 kgs. per annum, the output of these units have so far been negligible. Production is in fact still on an experimental basis. Almost the entire demand is therefore met by imports which have been as follows :

1952	15,000 kgs.
1953	34,850 kgs.
1954	17,900 kgs.—all synthetic anti-malarials.
1955	29,500 kgs. „ „ „

6. *Anti-dysentery drugs (quinolines)*.—Quinolines are produced by a number of firms and the total capacity is estimated at 76,000 kgs. per annum. As many of these units operate on a semi-commercial scale, production has been uneconomical and has remained at a low level. A few of these firms produce the drug starting from basic raw materials and others from the imported intermediate, 8-hydroxy quinoline.

7. *Anaesthetics*.—Capacity exists for the production of some of the common anaesthetics like ether, chloral-hydrate, and ethylchloride. The manufacture of certain other anaesthetics like chloroform, procaine hydrochloride and phenobarbitone etc. has yet to be taken up in the country. There are at present 3 manufacturers of anaesthetics with a total capacity of 712,352 kgs. of ether, 54,370 kgs. of chloral-hydrate and 32,800 kgs. of ethylchloride. The figure for ether indicates the combined capacity for both anaesthetic and solvent ether. The existing capacity for these items is considered to be adequate to meet the requirements. Chloroform was produced during the war by some firms but was given up later since its production was considered to be uneconomic. Procaine hydrochloride has assumed considerable importance as it is required in increasing quantities in the production of procaine penicillin.

Production of anaesthetics in recent years has been as follows :—

	Ether	Chloral-hydrate	Ethylchloride
	(Kgs.)	(Kgs.)	(Kgs.)
1952	77,313	10,555	6,850
1953	103,143	11,033	11,718
1954	164,647	1,717	4,800
1955	203,400	28,700	15,400

Imports of anaesthetics which are not manufactured in the country are given below :—

	Chloroform	Procaine hydrochloride	Phenobarbitone
	(Kgs.)	(Kgs.)	(Kgs.)
1953	37,137	429	620
1954	60,078	18,250	1,335
1955	73,000	3,400	2,100

8. *Insecticides*.—DDT and benzene hexachloride are two of the important insecticides whose production was expected to be taken up during the First Plan. With the completion of the factory of the Hindustan Insecticides in Delhi which went into production in March 1955, indigenous capacity has been created for the manufacture of 700 tons of DDT per annum. The present rate of output of this factory is about 1·5 tons per day.

The production of benzene hexachloride in a plant with an annual capacity of 500 tons was commenced at Rishra near Calcutta in 1953. Its capacity has been further expanded to 1,000 tons per annum. Another new factory has been set up in Mithapur with an annual capacity of 1,500 tons.

Production of DDT and benzene hexachloride has been as follows :—

Year	DDT (Tons)	BHC (Tons)
1953	..	154
1954	..	434
1955	172	1,603

9. *Vitamins.*—No substantial development in this field has taken place during the First Plan period. Shark liver oil, which provides an important source of vitamin 'A' is produced in factories set up by the Bombay, Madras and Travancore-Cochin Governments. The total capacity for shark liver oil of the existing factories is estimated at 70,000 gallons per annum of 6,000 i.u.g. of vitamin 'A'. The establishment of a plant for the production of nicotinic acid and amide is under consideration. Folic acid is being produced, starting from imported zinc foliate. The annual capacity for folic acid is estimated at 304 kgs. Substantial quantities of vitamins and vitamin preparations are, however, imported. Imports of certain vitamins are estimated to have been as follows :—

Year	Unit	Vitamin 'A'	Vitamin 'B'1	Vitamin 'B'2	Vitamin 'B'6
1952	kgs.	207	1,102	69	25
1953	,,	1,267	2,784	348	119
1954	,,	2,590	4,003	754	240
1955	,,	5,700	4,614	880	289

The largest consumption of Vitamin 'A' is as a fortifier of vanaspati. The demand for it is expected to increase substantially with the rise in the production of vanaspati envisaged during the Second Plan. The present consumption of vitamin 'A' in the vanaspati industry is estimated at a little over 2,000 kgs. which is likely to go up to nearly 4,000 kgs. by 1960-61.

The existing installed capacity for the production of certain other important drugs is as follows :—

Sodium salicylate	125,000	kgs.
Calcium lactate	200,000	,,
Calcium gluconate	60,000	,,
Saccharine	25,000	,,
Galenicals	3,000,000	gallons.
Strychnine	10,000	kgs.
Ephedrine	1,500	,,
Caffeine and salts	5,500	,,
Opium alkaloids	1,400	,,

Imports and exports.—With the advent of new synthetic drugs, dependence on imports has considerably increased. The total value of imports of drugs and medicine stood at about Rs.10 crores in 1950-51 and has remained at a high level during the entire Plan period. Imports amounted to Rs. 15 crores in 1951-52, Rs. 11 crores in 1952-53, Rs. 12 crores in 1953-54 and Rs. 13 crores in 1954-55. Penicillin and other antibiotics, sulpha drugs, anti-malarials, vitamin preparations and proprietary and patent medicines accounted for the bulk of these imports. The following table indicates the value of important categories of drugs and medicines imported in recent years:—

(Value in Rs. lakhs)

	1952-53	1953-54	1954-55	1955-56 (Nine months, April to December)
Antibiotics—				
Penicillin and its products	1,64·6	1,85·7	1,47·7	1,30·2
Other antibiotic products	2,45·2	2,64·6	2,65·4	1,67·9
	4,09·8	4,50·3	4,13·1	2,98·1
Sulpha drugs	95·7	75·4	1,01·0	77·3
Vitamins and vitamin preparations	N.A.	N.A.	1,54·1	1,53·9
Liver and glandular products	15·4	9·3	5·5	3·2
Anti-malarials	34·7	43·9	2·2	9·0
Proprietary and patent medicines	23·3	1,85·7	2,56·1	2,21·2
Other sorts of drugs and medicines	5,55·2	4,64·9	3,82·2	2,78·5
TOTAL	11,34·1	12,29·5	13,14·2	10,41·2

Imports of proprietary and patent medicines have shown an unfortunate tendency to go up in recent years. It is desirable to keep these imports at a minimum level.

Exports of drugs and medicines which are mainly confined to certain crude drugs of vegetable origin have been of the value of about Rs. 2 crores per annum.

Enquiry into the pharmaceutical industry.—The Ministry of Commerce and Industry appointed a Committee in February 1953 to make a comprehensive enquiry into the working of the pharmaceutical industry with a view to suggesting the steps to be taken by Government to put this industry on a sound basis. The Committee were asked to study in all its aspects the working of the existing pharmaceutical manufacturing concerns, including the quality of the drugs and their cost of production, and to recommend steps for encouraging the manufacture of important drugs which are imported into the country. The Committee, which submitted its report in June 1954 made a number of recommendations on measures to be taken (a) to improve the existing conditions in the pharmaceutical industry, (b) to ensure the standardisation and control on quality of drugs and pharmaceutical preparations, (c) to ensure supplies of essential raw materials to the industry, and (d) to promote the development of the manufacture of basic drugs in the country. Some of the important recommendations made by the Committee are :

(*i*) The manufacture of basic drugs should be encouraged. Each manufacturing concern should endeavour to produce as many fine chemicals and drugs starting from basic chemicals and/or intermediates as close to the basic chemicals as practicable for the time being, in quantities sufficient to meet, not only its own requirements but also of other firms which process them.

(*ii*) Coal-tar products which constitute an important class of raw materials to the pharmaceutical industry are also required by the plastic and dyestuff industries. A long-term programme for the production of coal-tar chemicals designed to meet the requirements for coal-tar products of the pharmaceutical, plastic and dyestuff industries should be drawn up.

(*iii*) Foreign collaboration in the drug industry in future should normally be permitted only if the products that are going to be manufactured are proposed to be produced from basic chemicals and/or intermediates as near to the basic chemicals as possible.

(*iv*) The royalty agreements between foreign firms and Indian manufacturers should be suitably rationalised and the patent laws of the country should be amended to secure effective utilisation of all developments in the field of science and medicine wherever necessary in the interest of the country.

(*v*) In order to overcome the defects in the operation of the drug control existing at present and to bring about a uniformity in the standard of drugs manufactured, the administration of drug control should be centralised by bringing control of manufacture, sale and distribution under the Drugs Controller (India).

(*vi*) To ensure future development of the pharmaceutical industry along desired lines, immediate steps should be taken by the Government to constitute a Development Council for pharmaceuticals and drugs.

A Development Council for pharmaceuticals and drugs was set up by the Government in 1955. This Council is entrusted with the task of advising the Government on matters relating to the development of the industry. The Government have also adopted the guiding principles contained in the recommendations on the production of pharmaceuticals starting from basic chemicals and on foreign participation in the industry in considering applications for licences for the expansion of the industry. Further the Government are actively considering measures for centralising the administration of the Drugs Act and exercising central control over the quantum of production. As a first step towards achieving a better co-ordination in the working of the Drugs Act and the Industries (Development and Regulation) Act, the Government have appointed the Drug Controller (India) as an *ex-officio* Industrial Adviser (Pharmaceuticals and Drugs).

Action on recommendations.—Considerable emphasis was laid in the Plan on the need for manufacturing as many pharmaceutical chemicals and drugs as possible starting from basic chemicals and/or simple intermediates. Not much progress has been made in the production of modern synthetic drugs from simple primary chemicals and raw materials. Apart from the complex technical know-how involved in their manufacture, the non-availability of most of the primary chemicals themselves has hindered the development of this industry along the lines recommended in the Plan.

Certain intermediates required for the production of pharmaceuticals and drugs can be produced more economically by planning their capacities to meet the overall requirements of other allied industries like dyestuffs and plastics. Since the last mentioned two industries are also in the preliminary stages of development, hardly any attempt has been made to undertake their manufacture. This is a matter which is expected to receive attention during the Second Plan period.

The Plan made recommendations for the provision of cold storage facilities in slaughter houses at some of the big cities for the preservation of animal tissues and glands required for the manufacture of hormones and glandular products. This matter is under consideration by the Food and Agriculture Ministry who have appointed an *ad hoc* Committee to look into the question. A proposal to set up a modern slaughter house with all necessary facilities in Bombay is at present under the consideration of the Bombay Government.

II. Programme of Development in the Second Plan.

Estimated requirements.—Statistics relating to imports of drugs and medicines are not furnished in sufficient detail to enable a precise estimate to be made of their present consumption. The Pharmaceutical Enquiry Committee roughly estimated the consumption and demand of some of the essential drugs in 1952 as follows :—

	Unit	Home consumption	Demand
Antibiotics—			
Penicillin	Million mega units	12·6	20·0
Streptomycin	kgs.	9,061	10,000
Chloramphenicol	'ooo gms.	1,800	2,500
Aureomycin	„	365	400
Terramycin	„	334	400
Sulpha drugs	'ooo lbs.	664	665
Anti-malarials—			
Quinine and its salts	„	130	100
Synthetics	„	190	100
Vitamins—			
Cod liver oil	„	124	100,000 gallons
Shark liver oil	Gallons	19,857	
Nicotinic acid and amide	lbs.	570	1,200
Folic acid	„	52	110
Anaesthetics and analgesics—			
Barbiturates	kgs.	1,280	2,280
Chloral-hydrate	'ooo lbs.	125	35
Procaine hydrochloride	„	319	350
Cocaine and cocaine hydrochloride	„	103	110
Anti-tuberculosis drugs—			
PAS & salts	„	115·5	105
Isoniazid	lbs.	5,527	20,900
Other drugs—			
Quinolines	'ooo lbs.	22	30
Aspirine	Million lbs.	1·5	1·5
Sodium salicylate	'ooo lbs.	450	450
Phenacetin	„	113	120
Saccharine	„	N.A.	200

The requirements of drugs and pharmaceuticals for a country of the size and population of India are obviously very large. The effective demand, is however, dependent on the facilities for medical treatment and the cost of the drugs. The medical facilities available to the people at present can by no means be considered adequate. With the expansion of these facilities on a wide scale, a substantial rise in the demand for drugs may be expected during the next five years. The demand for some of the essential drugs would also increase very appreciably if these could be made available at cheaper prices. The Development Council has estimated the demand for some of the essential drugs, during the Second Plan period as follows :—

1. Antibiotics	Penicillin	40 million mega units
	Streptomycin	18,000 kgs.
	Chloramphenicol	10,000 ,,
	Tetracyclin	10,000 ,,
2. Sulpha drugs		450,000 ,,
3. Anti-T. B. drugs	PAS	113,300 ,,
	INH	10,000 ,,
4. Anti-leprosy drugs	DDS and its derivatives	11,300 ,,
5. Anti-malarials	Synthetic anti-malarials	50,000 ,,
6. Anti-dysentery drugs	Quinolines	50,000 ,,
7. Anaesthetics	Ether	720,000 ,,
	Chloral-hydrate	60,000 ,,
	Ethylchloride	33,000 ,,
	Chloroform	75,000 ,,
	Procaine hydrochloride	50,000 ,,
	Phenobarbitone	2,300 ,,

As regards insecticides, the Ministry of Health has estimated that during the anti-malarial campaign, their peak demand will be 8,000 tons per annum. During the subsequent period, about 5,000 tons of insecticides per annum will be required for maintenance purposes. As regards other important drugs, the demand by 1960-61 is estimated as follows :—

Vitamin A	6,600 kgs.
Vitamin B. 1	12,000 ,,
Vitamin B. 2	2,000 ,,
Saccharine	80,000 ,,
Nikethamide	10,000 ,,
Quinine	100,000 ,,
Calcium lactate	200,000 ,,
Calcium gluconate	60,000 ,,

Schemes licensed and projected.—So far the development of the drug industry has mainly taken the form of the manufacture of simple drugs and the processing or refining of imported intermediates and penultimate products. While this may be a desirable preliminary stage in the building up of a drug industry steps have to be taken soon to produce drugs from primary chemicals.

During the Second Plan period, production of penicillin and other antibiotics is expected to be expanded and there are also several schemes in the private sector for expanding the production of various other drugs. Some of the more important of these schemes are indicated below:—

Antibiotics.—As already stated the penicillin factory at Pimpri which went into production in 1955 will have an annual capacity of 15 million mega units by the end of 1956. It is proposed to expand the capacity of this factory to 24 million mega units per year by installing additional fermenters. The scheme is estimated to cost Rs. 42·35 lakhs and is expected to be completed by 1957. "Bicillin" which is an improved formulation of penicillin will be produced to the extent of 20 per cent of the total production. Necessary technical assistance is expected to be provided by UNTAA. Fully automatic bottling equipment, capable of producing 33 million vials a year, is also being installed at Pimpri.

The Hindustan Antibiotics also propose to take up the manufacture of certain other antibiotics like streptomycin. Concrete proposals in this regard are still being worked out. The Plan makes a tentative provision of Rs. 1 crore for the expansion of the Hindustan Antibiotics.

Two schemes in the private sector for the manufacture of penicillin have been licensed, *viz.* :—

(a) The Alembic Chemicals, Baroda, who are establishing a plant for the production of 4·8 million mega units of penicillin per annum, and

(b) The Standard Pharmaceutical Works, Calcutta, who are setting up a pilot plant for the production of 1·8 million mega units of penicillin per annum. This firm will also produce 180 kg. of streptomycin per year.

These plants are to go into production in 1956 and will produce these antibiotics starting from primary raw materials.

The expansion programme of the Parke Davis and Co. for increasing their capacity for chloramphenicol to 10,000 kgs. per annum has already been mentioned. The Rambaxy and Co., Faridabad, also have been given a licence to set up a plant for the manufacture of 3,000 kgs. of the same drug.

The Mac Laboratories, Bombay, have also been granted a licence for the manufacture of chloramphenicol on the basis of a phased programme according to which they will ultimately produce the drug from cinnamyl alcohol imported from Italy. The capacity of the plant is proposed to be 500 kgs. per annum.

Anaesthetics.—Two firms, Fedco, Bombay and Sarabhai Chemicals, Baroda, have been granted licences for the manufacture of procaine hydrochloride. Together they will have an annual capacity of 60,650 kgs. The demand for this drug is on the increase since it is required for the production of procaine penicillin.

Insecticides.—The capacity for DDT in the public sector is planned to be stepped up substantially during the Second Plan with the expansion of the existing factory at Delhi from an annual capacity of 700 tons to 1,400 tons and the establishment of a second DDT plant with an annual capacity of 1,400 tons at Alwaye in Travancore-Cochin. Both these schemes are expected to be completed by the end of 1957-58. The Plan makes a provision of Rs. 1 crore for this purpose.

With the completion of these two schemes, capacity will be created for DDT to the extent of 2,800 tons per annum. The balance of requirements of insecticides, the steady demand for which is estimated at 5,000 tons per annum, is proposed to be met in the form of benzene hexachloride. The present capacity for benzene hexachloride is 2,500 tons per annum. This is considered to be adequate to meet the full requirements of the country.

The manufacture of other insecticides, pesticides and fungicides like lindane, coppesan, nictoine sulphate, pyrethrum extract, etc., are also proposed to be undertaken by some of the manufacturers.

Among the other important drugs for the manufacture of which licences have been issued are synthetic drugs like arsenicals, calcium gluconate, ferrous gluconate, synthetic hormones, alkaloids and vitamins. The production of nicotinic acid and amide, vitamin 'K' and vitamin 'A' in water soluble form from fish liver oils is also proposed to be started or expanded. A proposal to produce vitamin 'A' from lemon grass oil, the supplies of which are plentiful in Travancore-Cochin, is also under the consideration of the Central Government.

The programmes indicated above will, in some measure, help towards the achievement of self-sufficiency in certain items and towards making a beginning in the manufacture of a number of other important drugs. However, the overall progress likely to be achieved as a result of these schemes can by no means be considered satisfactory. It will still be necessary to import, in varying quantities a number of essential drugs like vitamins, synthetic anti-malarials, antibiotics; and further, even in the case of drugs whose indigenous production is proposed to be taken up, there will still be considerable dependence on imported raw materials and intermediates. In the pharmaceutical industry, where new developments are taking place at a rapid pace and more effective and potent drugs and remedies are discovered or synthesised, it is difficult to envisage self-sufficiency in regard to all items. At the same time, in the matter of such an essential commodity as drugs, undue dependence on imports is not only undesirable but is also likely to hamper prospects of extending medical facilities on a wide scale. It is, therefore, imperative that a programme designed to meet the bulk of the requirements of essential drugs and pharmaceuticals and particularly such as are in demand in substantial quantities be drawn up and executed as early as possible. Most of the synthetic drugs which have been recently put on the market are complex in nature and require a variety of basic chemicals for their manufacture. Their production also calls for a high degree of technical know-how and experience. One of the primary causes of the halting development of the drug industry in this country has been the non-existence of a basic chemical industry to provide the required basic materials for the manufacture of synthetic drugs. On the other hand, the demand for these primary organic and inorganic chemicals from the drug industry is too small to enable economic units to be set up for their production. Many of these chemicals are, however, required in the dyestuff and plastic industries and have been developed in other countries as part of an integrated scheme for meeting the combined demand of all these consuming industries. Conditions are now favourable for undertaking the manufacture of primary and intermediate chemicals in a similar way in this country also. During the Second Plan, a considerable expansion of the dyestuff industry is envisaged which has been discussed under the programme relating to the dyestuffs and intermediates industry. In planning the production of intermediates for the dyestuff industry, if sufficient excess capacity is provided for such of those as are required by the drug industry, it will ensure supplies of these intermediates to the drug industry at a reasonable price. Adequate supplies of benzene, toluene, and other primary organic chemicals are expected to be available from the coke-oven plants that are being set up in conjunction with the steel plants and from coal-tar distillation plants proposed to be set up during the Second Plan period. Easy and abundant supplies of these chemicals provide the necessary condition for taking up the manufacture of drugs based on primary raw materials. The formulation of an integrated programme of development for the pharmaceutical and dyestuff industries is at present engaging the attention of the Government. The Drug Committee of the Health Panel appointed by the Planning Commission have also made certain suggestions and recommendations in this regard. The studies into the future pattern and quantum of development of the pharmaceutical industry in India in progress with the help of a team of Russian experts are expected to enable the formulation of a detailed programme of integrated development of this industry in the near future. A comprehensive programme for the development of this industry should cover the manufacture of as many essential drugs as possible from basic raw materials and should be accorded a high priority during the Second Plan.

Capital investment.—The investment in the private sector during the period of the Second Plan is envisaged at Rs. 3 crores. The outlay on the projects in the public sector is placed at Rs. 2 crores on the basis of the present provision in the Plan.

Miscellaneous.—Research plays a considerable part in the development of the pharmaceutical industry. Most of the leading manufacturers abroad have their own laboratories where research is conducted with a view to improving their products and discovering better and more efficacious drugs. The drug industry is one where high standards have to be maintained by constant research and experiments but the research facilities available in this country are meagre. Barring a few institutions like the Haffkine Institute and the Central Drug Research Institute set up by the Government there are hardly any laboratories where research work on new drugs is conducted. Research facilities are essential not only for the maintenance of quality and improvement of products but also for keeping abreast of the developments in other parts of the world and their provision should receive special attention in the planning of establishments for drug manufacture. Such research laboratories will also be helpful in conducting investigations on the production of cheaper substitute medicines from indigenous raw materials. The research laboratory associated with the penicillin plant of the Hindustan Antibiotics is expected to make a valuable contribution to studies in the antibiotics field.

The Pharmaceutical Enquiry Committee has recommended various steps for fostering the development of this industry along proper lines. These recommendations should, so far as possible be implemented in consultation with the Development Council for Drugs and Pharmaceuticals.

The following production targets by 1960-61 are envisaged for some of the important drugs:—

Penicillin	40	million mega units
Streptomycin	18,000	kgs.
Chloramphenicol	10,000	,,
Tetracyclins	10,000	,,
Sulpha drugs	450,000	,,
Para amino salicylic acid	113,300	,,
Isonazide	10,000	,,
Procaine hydrochloride	50,000	,,
DDT	2,800	tons
Benzene hexachloride	2,500	,,

28. STARCH AND GLUCOSE

A. STARCH

I. Brief Survey of the Industry

The starch industry in India is of comparatively recent origin. The first two factories, *viz.*, those of the Indian Starch Products, Kalol and the Bharat Starch and Chemicals, Yamunanagar, started operation in 1938. Before that, practically all the country's requirements of starch were met by imports. The total stoppage of imports of starch during the period of World War II, gave a strong fillip to the industry and by 1942 as many as forty-five factories had sprung up in different parts of the country. Most of them, however, were able to function only for a short period, and were forced to close down due to the shortage of essential raw materials like maize and wheat. During 1943, when acute famine conditions prevailed in the country, the Government of India issued the Starch Control Order, prohibiting the production of starch from wheat and fixing the prices of different varieties of starch. This order was subsequently amended in 1944 so as to bring the production and price of maize starch also under control. This resulted in most of the factories being compelled to close down. In 1950, the Government permitted the import of maize for the manufacture of starch which provided some relief to the industry. More recently, there has been a marked improvement in the outlook for the starch industry due to the improved food position in the country.

Location, rated capacity and production.—The Tariff Board in its first Report on the Starch Industry (1947) stated that there were 24 registered and 17 unregistered factories engaged in the manufacture of starch with an estimated rated capacity of 73,000 tons per annum. However, owing to the irregular supplies of maize and its poor quality, most of these factories were closed down and only a few of them were able to work to some extent. In 1947 and 1948 there were only 7 factories in actual production with an annual capacity of 30,720 tons and in 1949 the number fell to 4, their installed capacity being 17,400 tons per annum. The situation remained more or less the same till 1951, when the number of factories in production increased to 11 with an annual capacity of 35,700 tons.

At present, according to the Tariff Commission's Report of 1955, there are 10 starch factories in active production with a total annual rated capacity of about 77,600 tons. Of these two factories with an annual capacity of 6,000 tons are reported to be operating on tapioca. The location and annual rated capacity of these factories is given below:—

Name of the unit	Location	Annual rated capacity (Tons)
1. Anil Starch Products	Ahmedabad	21,000
2. Maize Products	Do.	25,000
3. Bharat Starch and Chemicals	Yamunanagar	13,800
4. Sukhjit Starch and Chemicals	Phagwara	4,300
5. Gwalior Maize Products	Gwalior	3,000
6. Lakshmi Starch Factory*	Kundara	3,000
7. The Agricultural and Industrial Uplift Central Co-operative Society*	Quilon	3,000
8. Jaipur Maize Products	Jaipur	2,100
9. Shree Narendra Singh Ji Industrial Corporation	Bombay	1,500
10. Pearl Products Co.	Kanpur	900
	TOTAL	77,600

*Starch factories operating on tapioca.

The actual production of starch for the last six years has been as under :—

Year	Production (tons)
1950	910
1951	8,733
1952	7,762
1953	20,101
1954	36,872
1955	47,133

The increase in production in the last three years is mainly due to the improved supplies of raw materials.

Capital and labour.—A sum of about Rs. 1,15 lakhs has been invested in the industry by the firms at present engaged in the production of starch. The number of persons employed in the industry is about 1,800.

Raw materials.—The most suitable raw material for the production of starch in India is maize, although other raw materials such as wheat, *bajra* and *jowar* are also used. Some tapioca starch is also produced from tapioca roots, which are found in abundance in the South, specially in Travancore. The other raw materials required for the manufacture of starch are sulphur and a few chemicals. These are, however, required only in small quantities.

Until recently, the starch industry was dependent on imported maize which was principally obtained from the United States of America. The price of the imported maize rose steeply during the years 1949-51 making it difficult for the indigenous starch industry to carry on production in competition with imported starch. Thus according to the Tariff Commission's Report on the Glucose Industry, the cost of imported maize to the factories rose from Rs. 313 per ton in 1949-50 to Rs. 534·4 per ton in 1951, *i.e.* by more than 70 per cent. This resulted in a substantial increase in the price of indigenous starch. The position has, however, materially changed during the last two years and the prices of maize and starch have now come down to more reasonable levels.

In view of the acute food shortage in the recent past, investigations were made with a view to discovering non-edible products which could be used as substitute for cereal starch. Experiments carried out by the Forest Research Institute, Dehra Dun, showed that pectinous matter contained in tamarind seed has sizing and finishing properties somewhat similar to those of starch. Given a rigid standard and properly controlled method of manufacture, tamarind kernel powder can be prepared in satisfactory quality to be used as a substitute for ordinary starch in most of the requirements of the textile industry.

Imports.—The quantity and value of imported starch, dextrin and farina, recorded in the Foreign Trade and Navigation Accounts of India for the last six years have been as under :—

Year	Quantity (Tons)	Value (Rs. lakhs)
1950-51	47,461	3,58·57
1951-52	36,257	2,33·83
1952-53	910	7·75
1953-54	1,021	5·94
1954-55	885	5·18
1955-56 (Ten months, April to January)	502	2·66

It will be seen that there was a sharp fall in the imports of starch after 1951-52, due to increased production within the country consequent on greater availability of the raw materials. The current import policy does not permit of starch being imported, except for small quantities of edible corn flour to actual users having approved packing facilities.

Tariff protection.—Protection was first granted to the starch industry in 1948 when the existing revenue duty of 18 per cent *ad valorem* was converted into a protective duty at the same rate. In 1949, the protective duty was raised to 20 per cent *ad valorem* and the revenue duty of 18 per cent *ad valorem* on imported farina was converted into a protective duty and raised to 20 per cent *ad valorem*. A protective duty at the rate of 20 per cent *ad valorem* was also levied on imported sago flour. In 1951, the protective duty was further raised to 30 per cent *ad valorem* (exclusive of surcharge). The protection to the industry was extended from time to time till December 31, 1955. In 1955, the Tariff Commission reviewed the case for continuance of protection to the industry and came to the conclusion that the fall in the domestic price of maize and the improvement in its supply had removed one of the main disadvantages under which the industry had been labouring since its inception. The capacity of the industry had also increased considerably and was now more than sufficient to meet the requirements. The Commission, therefore, recommended that the protection to the industry need not be continued beyond December 31, 1955. The Government have accepted this recommendation and protection to the industry has been withdrawn since January 1, 1956.

Problems of the Industry.—The manufacturers of starch have been complaining of high freight rates, inadequate transport facilities and shortage of power supply. Freight rates are a matter of some importance to the starch industry, as a number of factories are situated at a considerable distance from the major consuming areas like Bombay and Ahmedabad.

II. Programme of Development in the Second Plan

Estimated reqirements.—At the enquiry made by Tariff Board in 1947, the demand for starch was estimated to be of the order of 50,000 tons per annum. In arriving at this figure, the Board estimated the requirements of the textile industry, which accounts for the bulk of the total demand, at 45,000 tons. The requirements of the paper and jute industries were estimated at 2,000 and 3,000 tons respectively.

The Tariff Commission reassessed the demand again in 1951 and 1955 and placed it at 45,000 to 50,000 tons per annum.

From the figures relating to production and import of starch for the five years 1950-54, it would appear that the average annual consumption during this period has been of the order of 32,000 tons. This somewhat low consumption may have been due to the short supplies of starch. The position has changed recently and the consumption during 1955 was over 45,000 tons, which is very near the estimate of demand made by the Tariff Commission.

With the increasing industrial expansion during the Second Plan, the domestic demand for starch may increase to about 100,000 tons per annum by 1960-61. This estimate has been arrived at on the following basis:—

(*a*) *Demand from the cotton textile industry.*—The total production of all varieties of cotton cloth is tentatively estimated to go up to 8,500 million yards by 1960-61. The total production of cloth in 1950-51 (including both mill-made and handloom) was nearly 4,500 million yards which may roughly be assumed to have accounted for 40,000 out of the 45,000 tons estimated as the demand for starch by the Tariff Board in 1951. If the target of 8,500 million yards visualised by 1960-61 is achieved the likely demand for starch on a *pro rata* basis would be about 75,000 tons by the end of the Second Plan period.

(*b*) *Demand from the paper industry.*—It has been estimated that the production of paper and paper-board will increase to about 350,000 tons by 1960-61. The production of paper in 1950-51 was nearly 114,000 tons. In that year, the paper industry is estimated to have consumed 2,000 tons of starch. On a proportionate basis, the requirements of starch for the paper industry is estimated at 6,000 tons per annum by 1960-61.

(*c*) *Demand from the jute industry.*—In view of the present level of production and international demand for jute products, it seems unlikely that any substantial increase in production can be expected during the period of the Second Plan. The requirements of starch by this industry may therefore be assumed to continue at about the present level of 3,000 to 3,500 tons per annum for the entire period of the Second Plan.

(*d*) *Demand from the glucose industry.*—The demand for starch from the glucose industry has so far been comparatively negligible since the industry has been operating at extremely low levels of production. However, it may be expected to step up its output during the Second Plan period to meet practically the entire requirements of the country. Assuming the total production of glucose, both liquid and powder, to be of the order of 8,000 tons by 1960-61, the requirements of starch by the glucose industry by that year may be estimated to be about 8,000 tons.

In addition a moderate increase in the consumption of starch can be expected from the cosmetic and pharmaceutical industries. Such requirements are, however, of a minor character and are not likely to result in any substantial variations in the total demand for starch.

(*e*) *Demand from export.*—Until recently, conditions were unfavourable for the export of starch. The scarcity and high prices of raw materials did not permit the indigenous producers to enter the foreign markets in competition with other starch producing countries. With the improved food position and the fall in the prices of maize and other raw materials, conditions are more favourable now for developing export markets for Indian starch. Already small quantities of maize and tapioca starch are being exported to neighbouring countries. A new unit for the manufacture of starch from tapioca is being put up in Travancore-Cochin in collaboration with a foreign firm. Arrangements have been made with the foreign partner for 75 per cent of the output of this factory to be exported. The annual capacity of this factory is 10,000 tons and if it works to full production, then 7,500 tons of starch will be exported every year. Increased exports by other manufacturers cannot be ruled out. It may not, therefore, be unreasonable to expect that export will reach the level of about 10,000 tons per annum by 1960-61.

Schemes under implementation.—The following development schemes are under implementation:

(*i*) The Pamba River Starch Co., sponsored by the Parry and Co. of Madras in collaboration with the Corn Products (India), have been given permission to start a starch factory with an annual capacity of 10,000 tons at Tiruvalla, Travancore-Cochin.

This factory is designed to produce starch from tapioca of which there are abundant quantities in Travancore-Cochin. The sponsors have entered into an agreement with their foreign collaborators for the export of 75 per cent of the output of the factory.

(*ii*) The Anil Starch Products have a programme for increasing their capacity for the manufacture of starch from 21,000 to 25,000 tons.

(*iii*) The Maize Products are also understood to be considering a proposal to expand their capacity from 25,000 tons to 32,000 tons.

Additional capacity.—With the implementation of the schemes mentioned above, the annual rated capacity of the industry will increase from 77,600 to 98,600 tons. This capacity falls a little short of the anticipated demand of 100,000 tons by 1960-61. This gap can however be met without much difficulty by a moderate expansion of the existing units and it does not, therefore, seem very necessary to establish any new units during the period of the Second Plan.

Investment.—It is estimated that a sum of about Rs. 1 crore will have to be invested in the starch and glucose industries during the Second Plan period to achieve the capacity targets envisaged for these industries.

Miscellaneous.—Although the general quality of indigenous starch gives satisfaction to the major consumers, *viz.* the textile industries, superior quality of starch is required in certain industries, *e.g.*, the glucose, pharmaceutical and cosmetic industries, etc. The demand from these industries, though small, ought to be met from indigenous sources. At present there are no standards laid down for edible and pharmaceutical starch. The Tariff Commission has recommended that such standards should be laid down by the Indian Standards Institution.

The following table summarises the development programme of the starch industry envisaged during the Second Plan :—

	1955-56 (Tons)	1960-61 (Tons)
Installed capacity	77,600	100,000
Production	47,000 (Estimated)	100,000
Domestic consumption	47,000	90,000
Export	..	10,000

B. GLUCOSE

The development of the glucose industry in India is closely related to that of the starch industry, the latter providing the raw material for the former. Glucose is produced in two forms, liquid and powder. Liquid glucose is used largely in the manufacture of confectionery, jams, fermentation products, etc., and also in the paper, textile and leather industries. Glucose powder, which is the form of glucose generally used as an invalid food, is produced in a high degree of purity by a more complete conversion of starch. It is also used in the pharmaceutical industry and for medicinal purposes.

I. Brief Survey of the Industry

Production of glucose in this country was first started on a commercial scale in 1944. The three starch companies which had plant and machinery for the manufacture of glucose at that time were the Anil Starch Products, Ahmedabad, the Rampur Maize Products, Rampur and the Bharat Starch and Chemicals, Yamunanagar, Punjab. In 1951, a new unit namely the Glucose and Food, Kurla, Bombay, also came into existence. Since 1948, however, both the Rampur Maize Products and the Bharat Starch and Chemicals have ceased production.

Location, rated capacity and production.—There are at present three units in India manufacturing liquid glucose. The annual rated capacity of these units is estimated to be about 9,100 tons for liquid glucose and 2,600 tons for glucose powder as indicated below :—

Name of the unit	Liquid glucose (Tons)	Glucose powder (Tons)
Anil Starch Products, Ahmedabad	2,100	..
Maize Products, Ahmedabad	6,000	2,000*
Glucose and Foods, Kurla, Bombay	1,000	600*
TOTAL	9,100	2,600*

* The capacity is not additional but alternative to that for liquid glucose.

Actual production of glucose has been much below capacity as can be seen from the following figures:—

Year	Production (Tons)
1950	219
1951	156
1952	105
1953	102
1954	224
1955	470

These figures indicate the total production of liquid glucose and glucose powder. The production of glucose powder only started from 1954 and the quantity produced so far is negligible.

Capital and labour.—As the existing manufacturers are mainly producers of starch, separate figures of capital invested and labour employed in the glucose plants are not available.

Raw materials.—The principal raw material required for the manufacture of glucose is pure starch with a strictly limited content of protein and soluble impurities. In addition, small quantities of hydrochloric acid or sulphuric acid and neutralising agents like soda ash are consumed; activated carbon is required for decolourising syrup. All these raw materials, except activated carbon, are available in the country.

Imports.— Statistics of total imports of glucose (all sorts) for the last six years are as follows :—

Year	Quantity (Tons)	Value (Rs lakhs)
1950-51	7,040	69·87
1951-52	13,831	97·19
1952-53	944	11·77
1953-54	2,377	22·11
1954-55	3,173	28·88
1955-56 (Ten months, April to January)	4,104	37·04

The marked increase in the imports of glucose during 1951-52 was due to the liberal import policy followed during 1951. Since 1952, imports of liquid glucose have been restricted, and only a small quantity is being imported at present. The import of glucose powder which was under Open General Licence till 1955 has now been brought under the quota system. The licensing policy for January-June, 1956 allows a quota of 100 per cent of half of the best year's imports. The bulk of imports in the past came from the U.S.A. but small quantities were also imported from the U. K., Holland, France and Belgium.

Tariff protection.—Tariff protection was first granted to the glucose industry in 1948, when the revenue duty of 30 per cent *ad valorem* was converted into a protective duty at the same rate. In 1951, a surcharge of 5 per cent was levied under the Finance Act enhancing the duty to 31 1/2 per cent *ad valorem.* In 1953, the duty on non-medicinal glucose was increased from 31 1/2 per cent *ad valorem* (inclusive of surcharge) to 50 per cent *ad valorem* (inclusive of surcharge). The period of protection was extended from time to time till December 31, 1955. In 1955, the Tariff Commission reviewed the case of the industry for continuance of protection and came to the conclusion that despite considerable improvement in the supply position of starch and the consequent reduction in the cost of production and despite the additional protection given to the industry, through an increase in the import duty and restriction of imports, the industry had not been able to achieve any increase in output and that the quality of its products was still not up to the required standard. The Commission, therefore, recommended that protection to the industry need not be continued beyond December 31, 1955. The Government have accepted this recommendation and protection to the industry has been withdrawn since January 1, 1956.

II. Programme of Development in the Second Plan

Estimated requirements.— (i) *Liquid Glucose.*- The Tariff Commission in 1953, estimated the demand for liquid glucose at 3,500 tons. Liquid glucose is used in the manufacture of confectionery up to 33 per cent of the weight of the finished products. The average production of confectionery during 1951-53 had been about 11,000 tons per annum, of which 9,000 tons were reckoned to be confectionery in which glucose had been used. On this basis the demand for liquid glucose came to 3,000 tons. The demand for liquid glucose from other food industries and pharamaceutical industry was taken as 500 tons and hence the total demand was estimated at 3,500 tons.

In the last two years, there has been a decline in the production of confectionery, which was, on an average, only about 8,000 tons in 1954 and 1955 and this may have led to a temporary decline in the consumption of liquid glucose. However, for estimating the requirements of liquid glucose during the Second Plan period, the present demand of liquid glucose may be assumed to be 3,500 tons. In a recent estimate, the Tariff Commission has also again placed the demand for liquid glucose at 3,500 tons.

With the rise in the standard of living visualised in the Second Plan period, it is considered that the demand for confectionery, food and pharmaceutical products will increase appreciably by 1960-61. This, in turn will be reflected in an increased demand for liquid glucose. In the case of a commodity like glucose, price is an important factor in determining demand. If the price of liquid glucose could be brought down an appreciable increase in demand might be expected. The installation of modern equipment and the availability of maize at lower prices may lead to a reduction in the price of glucose. Taking all these factors into consideration, it is estimated that the demand for liquid glucose may increase to about 5,000 tons by 1960. This represents an increase of about 7 per cent per annum. At a meeting in the Planning Commission with the representatives of the industry, an increase of this order was considered to be not improbable.

Glucose powder.—The present demand for glucose powder is estimated to be about 2,000 tons per annum. This estimate is based on the average rate of imports in recent years. Imports of glucose of all types have averaged about 5,300 tons for the last six years. Since the indigenous production has been almost negligible, the average imports of 5,300 tons can be taken as the current annual demand for liquid and powder glucose taken together. The annual demand for liquid glucose being of the order of 3,500 tons the balance of 1,800 tons to 2,000 tons can, therefore, be assumed to be the present demand for glucose powder.

As in the case of liquid glucose, price is an important factor to be taken into account in estimating the demand for glucose powder. Assuming the same rate of increase as in the case of liquid glucose, *viz.* 7 per cent per annum, the annual demand for glucose powder may be placed at 2,800 tons by 1960-61.

Schemes under implementation.—The following development schemes are under implementation :

(*i*) The Anil Starch Products are installing a composite unit for the manufacture of both liquid and powder glucose. The annual capacity of the Anil Starch Products, when this plant is installed, will increase to 6,000 tons of liquid glucose and 3,600 tons of glucose powder.

(*ii*) The Kamla Sugar Mills, Udamalpet are putting up a plant with an annual capacity of about 1,500 tons of glucose powder using tapioca flour as the chief raw material. They are expected to go into production by the middle of 1956.

Additional capacity.—With the implementation of the schemes mentioned above, the annual installed capacity of the industry for the manufacture of liquid glucose and glucose powder will increase to 13,000 tons and 7,700 tons respectively. This capacity is considered to be more than adequate to meet the anticipated demand of 5,000 tons of liquid glucose and 2,800 tons of glucose powder by 1960-61. It does not, therefore, seem necessary to expand the capacity of the industry further during the period of the Second Plan.

Miscellaneous.—The industry is of recent origin and the quality of the glucose produced by it has not always been up to the standard of imported glucose. The somewhat poor quality of indigenous starch and difficulties in obtaining activated carbon have been partly responsible for the poor quality of the product. The nature of the containers has also considerably influenced its keeping quality. Though there has been an improvement in the quality of the product during the last few years, there is still room for further improvement. Efforts should, therefore, continue to be made by the manufacturers to improve the quality of their products during the Second Plan period.

The following table summarises the development of the glucose industry envisaged during the Second Plan period :—

	1955-56		1960-61	
	Annual installed capacity	Production (Estimated)	Annual installed capacity	Production
Liquid glucose (Tons)	9,100	1,050	13,000	5,000
Glucose powder (Tons)	2,600	negligible	7,700	2,800

29. PLASTICS

The term 'plastic' is applied to a large group of resinous materials which are capable of being shaped into any desired form by the application, singly or together, of heat and pressure. The shaped articles are the plastic goods of commerce. Because of their versatility, plastics cover a rather wide field. They can be flexible like rubber, soft like silk, or strong like steel. Their applications embrace building, engineering and chemical industries; electric lighting and fitting industries; telephone and radio industries; transport such as railways, automobiles, shipbuilding and aircraft; textiles; medicine and surgery; cinema and photography; and surface coating. In many of the advanced countries, synthetic resins are now on an equal footing with fundamental materials like metal, wood, glass, stone, leather and rubber.

The development of the plastics industry in India, as in other countries, assumes special significance in view of its close relationship to the development and expansion of some basic chemical industries. Plastics manufacture creates a large demand for basic chemicals such as coal distillation products, alkalies and chlorine, alcohol and allied products, calcium carbide and allied products, and thus fosters the development of chemical industries in the country. India had made some headway in the production of these chemicals by the end of the First Plan and the programmes envisaged under the Second Plan are expected to provide raw materials which were not hitherto available indigenously at all or at reasonable prices and in sufficient quantities.

I. Brief Survey of the Industry

The plastics industry hardly existed in India before the Second World War. The Government gave recognition to it just after the war by constituting a Plastics and Celluloid Industries Panel to make recommendations for its development, and a separate Directorate to assist and look after the development of the industry.

Location, rated capacity and production. During the last eight years considerable progress has been made in the moulding branch of the industry. There are now more than 80 firms engaged in plastic moulding as against 40 in 1948. The industry is centred mainly in Bombay and Calcutta. About 40 moulding firms are on the active list of the Development Wing of the Ministry of Commerce and Industry. These firms possess 187 compression moulding presses with a capacity of about 12,600 tons, 244 injection moulding machines with a capacity of about 685 oz. and 47 extruders of sizes ranging from 1" to 4 1/2". These are machine capacities in terms of pressure and size. It is difficult to assess the capacity in terms of output of finished goods due to the large number of moulds and dies used by the industry.

There has been a considerable increase in the production of compression and injection moulded goods since 1948, as is evident from the figures given below:—

Year	Million gross
1948	0·37
1949	1·02
1950	2·29
1951	1.48
1952	1.54
1953	1.36
1954	1·31
1955	2·50

Difficulties in regard to the supply of imported raw materials after the start of the Korean War in June 1950, followed by the general recession in trade in 1952 and 1953 were responsible for the setback in production during 1951-54.

There are three units manufacturing polyvinyl chloride (PVC) plastic coated cables, wires and flexibles with an annual capacity of 11·0 million yards. Five units are manufacturing leather cloth with a capacity of 7·8 million yards per annum. In 1952, the Hyderabad Laminated Products, Secunderabad started production of phenolic resin laminates (using indigenous paper and textiles) and their present capacity is 150 tons per annum. The Imperial Chemical Industries commenced production in 1953 of polyethylene films used as moisture-proof and heat-sealable packing material and their present capacity is 450 tons per annum. The Plastic Extruders, Bombay are manufacturing layflat tubings with a capacity of 36 tons per annum. The manufacture of unsupported sheets of PVC was started in 1954 by the Plastics and Industrial Corporation, Bombay with an annual capacity of about 85 tons, which was doubled during the following year. This firm has also taken up the production of long-playing phonograph records with a capacity of 600,000 records per annum.

The production of the above items from 1951 onwards is tabulated below :—

Item	1951	1952	1953	1954	1955
PVC plastic coated cables, wires and flexibles ('000 yards)	3,475	3,990	3,750	4,230	10,870
Leather cloth ('000 yds.)	2,040	950	987	1,261	2,620
Phenolic resin laminates (tons)	..	40	25	100	140
Polyethylene sheets and films including layflat tubings (tons)	..	..	113	366	382
PVC sheets (unsupported) ('000 sq. yards)	..	..	..	360	615

Capital and labour. The total investment in the industry is estimated at about Rs. 6 crores. The labour employed is around 10,000.

Raw materials.—Phenolic resins for the manufacture of laminates (paper and textile base); phenol formaldehyde and urea formaldehyde moulding powders for compression moulding; cellulose acetate, cellulose acetate butyrate, and polystyrene moulding powders for injection moulding; casein and polyvinyl compounds for extrusion; sheets, rods and tubes of celluloid, cellulose acetate, polymethyl methacrylate, cast phenolics and polyvinyl chloride (PVC) for fabrication work and PVC and nitrocellulose resins for textile coating, are some of the materials in common use by the industry. The requirements of the various raw materials in 1955-56 are estimated as follows :—

	(Tons)
Phenol formaldehyde moulding powder	800
Urea formaldehyde moulding powder	300
Cellulose acetate/cellulose acetate butyrate moulding powders and sheets	400
Nitrocellulose, industrial (for celluloid, leather cloth and lacquers)	250
Polystyrene	2,500
PVC resins/compounds	400
PVC sheets	400
Polyethylene moulding powder	600
Celluloid sheets, rods and tubes	200
Acrylic moulding powder and sheets	200

With the exception of phenol formaldehyde moulding powder, production of which in the country is fairly large, other demands are mostly met from imports. During 1954-55 synthetic resins, moulding powders and semi-fabricated plastic materials valued at about Rs. 2·74 crores were imported.

Capacity and production of moulding powders.—The difficulty in importing moulding powders during the Second World War led to the manufacture of phenol formaldehyde moulding powder in the country. There are at present the following three concerns manufacturing this moulding powder with a combined capacity of 1,182 tons per annum :—

	Capacity (Tons)
Industrial Plastics Corporation, Bombay	750
Plastic Products of India, Satara (Bombay)	300
Indian Plastics, Kandivlee (Bombay)	132

The production of phenol formaldehyde moulding powder from 1951 onwards has been as follows :—

Year	(Tons)
1951	404
1952	298
1953	374
1954	472
1955	715

For the production in 1955, the requirements of raw materials were estimated as under :—

	(Tons)
Phenol	300
Formaldehyde	180
Hexamine	25

Machinery and moulds.—The machinery installed in the industry is almost wholly imported. Attempts have been made to produce compression and injection hand presses in the country on a cottage scale by a few engineering concerns.

Two or three engineering firms in the country are making some of the simple types of moulds. In addition, there are about 20 plastic moulding concerns which have set up their own tool rooms and some of them are producing simple moulds for compression and injection and dies for extrusion. Complicated and intricate moulds are still mostly imported. It is estimated that about 250 moulds are used by the industry each year. In 1954, for example, 240 moulds valued at about Rs. 15 lakhs were imported as against 260 in 1953.

Imports and exports. The imports of plastic raw materials, plastic manufactures and leather cloth from 1950-51 onwards have been as follows :—

		1950-51	1951-52	1952-53	1953-54	1954-55	1955-56 (Ten months, April-January)
Synthetic resins and moulding powders	(Tons)	2,840	4,000	3,820	3,800	4,940	5,780
	(Rs. lakhs)	113·74	158·16	140·11	148·10	185·91	184·54
Semi-fabricated plastic materials	(Quantity)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	(Rs. lakhs)	46·67	97·97	87·53	88·45	87·73	74·90
Finished plastic goods (not elsewhere classified)	(Quantity)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	(Rs. lakhs)	1·06	12·44	11·39	4·12	2·37	4·03
Leather cloth including artificial leather	('000 sq. yards)	78	4,192	75	133	120	28
	(Rs. lakhs)	2·32	53·02	3·22	5·14	5·19	1·25

The exports of finished plastic goods from 1951-52 onwards have been as follows :—

Year	(Rs. lakhs)
1951-52	6·45
1952-53	13·03
1953-54	15·98
1954-55	14·56
1955-56 (Ten months, April—January)	6·36

In order to give a fillip to exports an Export Promotion Council was constituted in 1955. It has also been decided to allow rebate of import duty at specified rates on raw materials used in the manufacture of plastic goods intended for export. At present the concession is given on urea formaldehyde, cellulose acetate/cellulose acetate butyrate and polystyrene moulding powders.

Tariff protection.—In 1950, protection was granted to the plastics industry in the manner indicated below up till March 31, 1953 and this has been extended from year to year up to December 31, 1956.

(*i*) The then existing revenue duty of 30 per cent *ad valorem* on phenol formaldehyde moulding powder was converted into a protective duty;

(*ii*) The import duties of 25 per cent (standard) on phenol and of 36 per cent (standard) and 26 per cent (preferential) on formaldehyde and hexamine were to be refunded to the manufacturers of phenol formaldehyde moulding powder who have a minimum annual production of 200 tons;

(*iii*) The existing revenue duty of 36 per cent *ad valorem* on electrical accessories was converted into a protective duty, the preferential rate of 24 per cent in respect of imports from the U. K. was increased to 30 per cent and the standard rate adjusted in accordance with the terms of the Indo-British Trade Agreement of 1939.

(*iv*) A reduction of duty from 30 per cent *ad valorem* to 20 per cent *ad valorem* was effected in respect of celluloid (sheets, rods and tubes), rennet casein and polyvinyl chloride resin.

The Tariff Commission is at present holding an enquiry into the industry.

Problems of the industry.—(a) India's backwardness in the production of chemical raw materials has been a big handicap in the development of the plastics industry. Production of many of the basic materials, e.g., polystyrene, polyvinyl chloride, etc. has yet to be established in the country.

(b) Most of the moulds used by the industry are imported at fairly high prices. Labour costs are the main item of expenditure in making a mould and these are much higher in other countries than in India. Apart from the fact that the manufacture of moulds is a highly specialised job, the principal difficulty in turning out moulds of the requisite quality in India is that of obtaining special alloy steel which at present has to be imported.

II. Programme of Development in the Second Plan

Estimated requirements.—The consumption of plastic goods in India before the last war was estimated at 500 tons per annum. In 1949, the Indian Tariff Board estimated the demand at 4,000 tons per annum of which about 75 per cent was estimated to be for domestic and utility articles and 25 per cent for industrial goods including electrical accessories.

It is reasonable to assume that there exists in India a large potential market for different types of plastic goods although considerable effort and enterprise are perhaps necessary to develop it.

It is rather difficult to foresee the demand in respect of some of the finished plastic goods consumed for non-industrial purposes since it would depend *inter alia* upon their price *vis-a-vis* products like glass, lac and shellac products which they can replace. It is best, therefore, to assess the total requirements in terms of the demand for moulding powders. The demand for various moulding powders in 1960-61 is estimated somewhat as follows :—

	(Tons)	
Phenol formaldehyde moulding powder	1,200	
Urea formaldehyde moulding powder	500	
Cellulose acetate/cellulose acetate butyrate moulding powders	800	
Nitrocellulose, industrial	600	(400 tons for celluloid and leather cloth and 200 tons for lacquers.)
Polystyrene moulding powder	3,500	
Polyvinyl chloride moulding powder	1,500	
Polyethylene moulding powder	3,500	
TOTAL	11,600	

Of the total demand for PVC moulding powder, the requirements of the electric cables industry are estimated at about 250 tons in 1960-61. The expansion of demand for polyethylene moulding powder is partly dependent on the decision to be taken regarding the use of this material as a lining for bags for storing nitrolimestone fertilizer to be produced in the country.

Targets of capacity and production.—The programmes envisaged in the following paragraphs do not deal in much detail with the fabricating sector of the industry, *i.e.*, the manufacture of finished plastic goods. Broadly speaking, this sector is organised on a decentralised basis, the number of large-scale establishments with investment of more than Rs. 5 lakhs being few in number. This section of the industry lends itself well to development in small-scale units in proximity to the centres of consumption. As regards leather cloth, no further addition to capacity seems to be necessary even if the demand were to rise to nearly twice the level of about 2·65 million yards in 1955. The programme for plastic coated cables is dealt with under the electric cables and wires industry. It is considered that expansion of capacity for polyethylene films, resin laminates and unsupported sheets of PVC may be necessary. The exact quantum of development necessary in the Second Plan in these sectors will depend on trends in consumer industries which are difficult to forecast and have necessarily to be kept under periodical review.

The following schemes for the manufacture of moulding powders were under implementation or under consideration at the commencement of the Second Plan :—

Company	Product	Programme
1. Indian Plastics, Bombay	Phenol formaldehyde moulding powder. Urea formaldehyde moulding powder.	Expansion by 130 tons per annum by 1960. 200 tons per annum by the end of 1956.
2. Rattanchand Harjasrai, Amritsar	Urea formaldehyde moulding powder.	Commercial production envisaged by the end of 1956.
3. Sirsilk, Kaghaznagar (Hyderabad)	Cellulose acetate	900 tons per annum.
4. Khilachand Devichand and Co., Bombay	Polystyrene from imported monomer.	2,700 tons per annum by the end of 1956.
5. Imperial Chemical Industries, Calcutta	Polyethylene moulding powder	3,500 tons per annum.
6. National Carbon Company, Bombay	Do.	1,600 tons per annum by the end of 1958.

The manufacture of polystyrene is based on collaboration with the Dow Chemicals of the U. S. A. Initially, the production will be from the imported monomer, styrene. The manufacture of styrene will be undertaken when the demand reaches a level of 4,500 tons per annum.

Further developments in the field of plastic moulding powders should ensure that capacity is brought into existence to meet the full requirements of moulding powders from internal sources by 1960-61. Assuming the implementation of the programmes mentioned above there would still be need for bringing additional capacity into existence, mainly for polystyrene and polyvinyl chloride. Industrial nitrocellulose (8-10 per cent nitrogen) is expected to be available in sufficient quantities from the ordnance establishments for meeting the demand in full.

Having regard to the programmes already under implementation or consideration and to the desirability of meeting fully from domestic production the demand for moulding powders as soon as possible, the targets for capacity to be aimed at are as follows :—

Moulding powder	(Tons)
Phenol formaldehyde	1,310
Urea formaldehyde	500
Cellulose acetate	900
Polystyrene	3,500
Polyvinyl chloride	1,500
Polyethylene	5,100
TOTAL	12,810

Investment.—The investment required for developing the above-mentioned capacity during the Second Plan period is estimated at Rs. 4 crores.

Requirements of raw materials.—The principal raw materials for the production of the plastic moulding powders are phenol, urea, formaldehyde, cotton linters, acetic acid and acetic anhydride, styrene, calcium carbide, chlorine and alcohol. In planning the overall production of these materials either independently or in conjunction with other industries, the demands of the plastics industry should be taken into account.

Central tool room.—The establishment of a central tool room for the manufacture of moulds should, if possible, be taken up as a common endeavour by the plastic moulders. In 1954 the Government invited to the country a U. N. expert on moulds who has prepared a blue-print for a central tool room costing about Rs. 30 lakhs. The blue-print has already been made available to the industry.

The following table summarises the development programme for the manufacture of moulding powders* in the Second Plan :—

	1955-56	1960-61
Capacity (Tons)	1,180	12,810
Production ,, ...	725	10,600

*This is exclusive of the capacity and production of nitrocellulose, industrial in ordnance factories.

30. PAINTS AND VARNISHES

I. Review of Progress in the First Plan

Targets.—The Planning Commission estimated that the requirements of ready-mixed paints, varnishes and enamels would rise to 60,000 tons per annum by 1955-56. Corresponding to this demand the targets of capacity and production for 1955-56 were envisaged at 70,000 tons and 60,000 tons respectively. The targets for nitrocellulose lacquers were fixed at 350,000 gallons and 300,000 gallons respectively.

Capacity and production.—In 1951 there were 50 major units engaged in the manufacture of paints, varnishes and enamels with an annual rated capacity of about 65,000 tons on a single shift basis. There was no change in capacity during the First Plan.

The State-wise distribution of capacity is given below :—

	Number of units	Capacity (Tons)
West Bengal	18	37,260
Bombay	16	18,360
Uttar Pradesh	5	3,900
Madras	3	840
Saurashtra	2	1,740
Other States	6	2,700
TOTAL	50	64,800

Besides the major units, there are 150 to 200 small units manufacturing paints and varnishes scattered all over the country.

There are at present 7 units manufacturing nitrocellulose lacquers and ancillaries with an annual capacity of 800,000 gallons.

There was an increase in the capacity for the production of lead and zinc pigments during the First Plan. The capacities in 1951 and in early 1956 are given below :—

	1951 (Tons)	1956 (Tons)
Zinc oxide	8,400	12,360
White lead	2,360	3,720
Red lead	5,080	5.100
Litharge	N.A.	N.A.

The production of the anatase variety of titanium dioxide pigment was started in the country in September 1951 by the Travancore Titanium Products who have a capacity of 1,800 tons per annum. The Indian Aluminium Co. started the production of aluminium paste and powder towards the end of 1951 and have an annual capacity of 500 tons.

The production of paints, varnishes and enamels and nitrocellulose lacquers including ancillaries from 1950 onwards has been as follows :—

	Paints, varnishes and enamels (Tons)	Nitrocellulose lacquers (Gallons)
1950	27,950	32,570
1951	33,480	92,100
1952	32,170	144,560
1953	32,060	204,110
1954	38,540	265,000
1955	39,030	298,300

The present output covers the entire range of paint products excepting a few required for special applications. As is evident from the figures tabulated above, there was a marked increase in production during the latter half of the First Plan period. However, the production of paints and varnishes during the closing year of the Plan falls far short of the production target of 60,000 tons, mainly due to lack of sufficient demand. The target of 300,000 gallons for nitrocellulose lacquers will have been nearly reached during 1955-56.

The production of various paint pigments manufactured in the country has been as follows:—

	Unit	Zinc oxide	White lead	Red lead	Litharge	Titanium dioxide	Aluminium paste and powder
1950	Tons	4,450	1,220	3,025	775	..	..
1951	„	4,840	820	2,830	830	152	13
1952	„	2,400	300	1,575	255	234	297
1953	„	3,890	660	2,340	475	..	56
1954	„	6,150	900	3,410	760	1,370	177
1955	„	6,370	730	3,950	915	1,810	260

The production of zinc and lead pigments received a setback during 1952 and 1953 due to the scarcity of non-ferrous metals in international markets as a result of stock-piling during the Korean War. In 1953 the titanium dioxide factory had to shut down due to lack of demand in the country, but a large order from the United Kingdom and the restriction on imports of lithopone, a competitive pigment, enabled production to be resumed early in 1954. The production of aluminium paste and powder received a setback during 1953 due to competition from imports.

Manufacture of new products.—It was recommended in the Plan that the industry should concentrate *inter alia* on fuller utilisation of the existing capacity for the production of new and improved varieties of paints. The new products, the manufacture of which was started in the country during the First Plan, are : high grade enamel coatings for refrigerators, wrinkled finishes for a variety of industrial applications, plastic emulsion paints, polychromatic finishes based on urea and urea melamine resins, aircraft and naval finishes, extra high temperature resisting paints and aluminium foil cap lacquers. Lacquers for finishing leather, super-synthetic enamels for electrical wires, food can lacquers and fluorescent paints are lines which show promise of immediate production.

Production has also been established in the country of cuprous oxide, an essential ingredient of anti-fouling paints for ship bottoms. A unit for the production of ultramarine blue (a pigment largely used in lime wash and laundering) with a capacity of 1,200 tons per annum has already been installed by the Rackitt and Coleman of India, Calcutta, in technical collaboration with their principals in the United Kingdom and is expected to commence operations shortly. The Cordite Factory at Aruvankadu (Madras) has succeeded in producing low viscosity nitrocellulose suitable for lacquers and supplies are expected to be available in the near future.

Imports and exports.—The total imports of paints and painters' materials are recorded in terms of value only. These have been as follows :—

Year	(Rs. lakhs) Imports	Exports
1950-51	1,08·8	24·5
1951-52	2,61·9	75·9
1952-53	1,35·1	56·2
1953-54	1,77·0	24·7
1954-55	1,88·0	23·9
1955-56 (Ten months, April to January)	2,14·5	21·3

A major portion of the current imports consists of raw materials for the industry. Imports finished paints and varnishes are very small.

There was a spurt in the exports of paints and painters' materials during 1951-53 probably due to the inability of the other exporting countries to meet the demand during the Korean War. Thereafter, they fell back again and have remained, more or less, steady at about Rs. 25 lakhs per annum during the last three years. With a view to encouraging exports, the refund of import duty on raw materials used in products meant for export has been suggested from time to time. This question was examined in the Ministry of Commerce and Industry and it has been decided that such rebate should be allowed and that paints and varnishes for export should be manufactured in bond. The constitution of an Export Promotion Council for this industry is also under consideration in the Ministry.

Capital and labour.—According to the Census of Manufacturing Industries (1953), the total capital invested in 46 units amounted to about Rs. 4·18 crores and the number of persons employed was about 4,980.

Excise duty on paints and varnishes.—An excise duty was imposed on paints and varnishes with effect from March 1, 1955. The duty is levied on a sliding scale depending upon the quantum of production in a factory so that the small-scale producer has to pay a lower rate of duty than the large-scale manufacturer. Manufacturers whose output does not exceed 50 tons of paints and 1,000 gallons of nitrocellulose lacquers per year are exempted from the levy.

ISI Certification Scheme.—In the paint trade today there are hundreds of brands of innumerable grades or qualities. The consumer often thinks that the right price for paint is the cheapest price. The preference for cheap goods of inferior quality is a serious problem to progressive and established manufacturers. But the present misguided consumer preference may change with the introduction and implementation of the Certification Mark Scheme proposed by the Indian Standards Institution. The scheme is based on ISI specifications for paints and allied materials and a minimum standard of quality is expected to be ensured for the consumer by its implementation.

II. Programme of Development in the Second Plan

Estimated requirements.—It is difficult to assess the demand five years hence for a commodity like paints and varnishes which has innumerable uses. The demand arises mainly from railways, building operations and industries like the automobile, bicycle and electrical equipment industries. About 30 per cent more wagons and coaches are expected to be put on the line during the Second Plan and general construction programmes are likely to be increased by about 50 per cent in the Second Plan over those in the First. The production of automobiles and bicycles is expected to rise by about 125 per cent during the Second Plan period. Having regard to all these factors the consumption of paints, varnishes and enamels may be roughly estimated to rise by not less than 50 per cent during the Second Plan, *i.e.*, from about 40,000 tons in 1955-56 to 60,000 tons in 1960-61. The demand for nitrocellulose lacquers may increase from about 300,000 gallons to 500,000 gallons with the development of furniture making, sports goods and other nitrocellulose consuming industries during the same period.

There appear to be good prospects for exports of paints and varnishes during the Second Plan if Indian products can compete in price with similar products from other exporting countries. The proposed refund of import duty on raw materials used in the manufacture of products intended for export should materially assist in increasing exports.

Targets of capacity and production.—The existing capacity for ready-mixed paints and varnishes, *i.e.*, 65,000 tons, is considered sufficient to meet the demand during the Second Plan. In case the consumption exceeds the capacity figure, some of the existing units could work on double shift or they could expand their capacity to meet the requirements.

The present capacity for nitrocellulose lacquers, *i.e.*, 800,000 gallons, is more than sufficient to meet the demand during the Second Plan.

Employment.—The development of the paints and varnishes industry in the Second Plan is not expected to make any significant contribution to the employment situation. The increased utilisation of the existing capacity may provide work to about 1,000 more persons.

Requirements of raw materials.—It is rather difficult to estimate the requirements of raw materials for the production of 60,000 tons of paints in 1960-61 because (a) they are very numerous, and (b) the compositions are being continuously improved by the use of new and varied raw materials.

The following raw materials are at present imported; congo opal, gilsonite, china wood oil, pigment dyestuffs, ultramarine blue, yellow synthetic oxide of iron, carbon black, anti-fouling toxics, rutile titanium dioxide, lithopone, antimony oxide, whiting, cellulose chips, special extenders, low viscosity nitrocellulose, phthalate plasticisers, lacquers, solvents, numerous synthetic resins and plastics, chlorinated rubber and wetting and dispersing agents. As already stated, ultramarine blue and low viscosity nitrocellulose are expected to be available shortly from indigenous sources. Rutile titanium dioxide is expected to be manufactured by the Travancore Titanium Products. The production within the country of yellow oxide of iron, red and yellow pigment dyestuffs, synthetic resins, phthalate plasticisers and solvents for lacquers is expected to be achieved in the near future. The quality of iron oxide pigment produced from the pickle liquor of the steel works by the Tata Iron and Steel Co. is not considered satisfactory by the industry. Tung oil produced in the country is stated to be inferior to the imported product which is derived from an Aleurites species different from that grown in India.

The table below summarises the development of the paints and varnishes industry in the Second Plan:—

	1955-56	1960-61
(*a*) Ready-mixed paints, varnishes, etc.—		
Capacity (Tons)	65,000	65,000
Production („)	39,000 (Estimated)	60,000
(*b*) Nitrocellulose lacquers—		
Capacity (Gallons)	800,000	800,000
Production („)	300,000 (Estimated)	500,000

31. SOAP

I. Review of Progress in the First Plan

Targets.—The Planning Commission estimated the demand for soap in 1955-56 at 200,000 tons of which 10,000 tons were expected to be required for export. This estimate implied that the *per capita* consumption of soap in the country would rise from about 10 oz. in 1950-51 to about 17½ oz. in 1955-56.

Corresponding to these estimated requirements, the target for production by 1955-56 was fixed at 200,000 tons. On the basis of the expansion in capacity resulting from the schemes already under implementation at the commencement of the Plan, the annual capacity of the industry was expected to rise to about 280,500 tons by 1955-56.

Capacity.—The capacity of the soap industry in 1951 was estimated at about 265,000 tons made up of 192,000 tons of large and small-scale factories and about 73,000 tons of cottage units. 56 soap factories had been registered under the Industries (Development and Regulation) Act, 1951 as on January 1, 1956. They have a total installed capacity of about 199,000 tons per annum. Besides these, there are a large number of units in the small and cottage sector spread all over the country. 18 of these are known to be fairly well-organised and report their production regularly to the Development Wing of the Ministry of Commerce and Industry; their capacity is about 41,000 tons per annum. It is difficult to ascertain the total number of units in the cottage and small-scale sector and their capacity, but the Directors of Industries of some States have attempted to put together the available information. Reports received in the Development Wing from seven States indicate the existence of 413 units with a capacity of about 85,000 tons per annum. Some of these estimates, especially those of capacity, may be exaggerated but it may perhaps be reasonable to conclude that the capacity of the unorganised sector is not less than 100,000 tons per annum. Thus the total capacity of the soap industry may be estimated at 340,000 tons per annum. The State-wise distribution of this capacity is given below :—

State	Registered organised units		Unregistered organised units		Cottage-scale units	
	Number	Annual capacity	Number	Annual capacity	Number	Annual capacity
		(Tons)		(Tons)		(Tons)
1. West Bengal	12	44,540	3	22,400	N.A.	N.A.
2. Bombay	11	85,850	3	3,680	39	26,260
3. Madras	7	12,450	3	2,500	N.A.	N.A.
4. Uttar Pradesh	6	16,010	1	1,200	218	19,500
5. Madhya Pradesh	5	2,780	..	..	13	3,750
6. Mysore	3	3,200	..	..	9	2,530
7. Saurashtra	3	3,960	..	..	N.A.	N.A.
8. Travancore-Cochin	2	19,360	..	..	12	6,880
9. Delhi	2	4,200	2	4,370	N.A.	N.A.
10. Punjab	2	2,240	3	4,340	106	21,600
11. Andhra	1	1,140	2	1,830	N.A.	N.A.
12. Madhya Bharat	1	1,500	..	..	N.A.	N.A.
13. Bihar	1	1,800	..	..	N.A.	N.A.
14. Assam	..	..	1	860	N.A.	N.A.
15. Hyderabad	..	..	..	..	16	4,390
TOTAL	56	199,030	18	41,180	413	84,910

New schemes licensed.—In view of the difficulty experienced by the industry in utilising to the full the existing capacity it was recommended that ordinarily no additional capacity should be allowed to come up during the First Plan period.

Permission was, however, granted for the Mysore Government Soap Factory, Bangalore, to expand its capacity by 750 tons per annum as land had already been purchased to enable the factory to shift to a new site and it was proposed to rationalise operations by replacing old machinery and installing a glycerine recovery plant to bring down the cost of soap. This expansion scheme is under implementation.

Three existing firms, *viz.* the Lever Bros. (India), the Tata Oil Mills and the Swastik Oil Mills were permitted to manufacture some special soaps, for example, germicidal soap, shaving soap, etc. by utilising a part of their existing idle capacity.

Production.—The production of different types of soap by organised factories from 1950 onwards has been as follows: —

	Unit	1950	1951	1952	1953	1954	1955
Washing soap	Tons	59,670	67,155	71,080	68,370	70,900	82,000
Toilet soap	”	11,935	14,895	13,810	12,555	15,500	15,000
Medicated soap	”	210	205	230	225	250	300
Other sorts	”	885	1,185	1,250	1,050	1,350	1,700
TOTAL	”	72,700	83,440	86,370	82,200	88,000	99,000

As is evident from the figures tabulated above, there has been a marked increase in the production of soap by the organised sector in 1955.

Production figures for the unorganised units are not available. In 1950 their production was roughly estimated at 30,000 tons, but it is quite possible that the production is much higher than was previously thought. On the basis of the consumption of caustic soda, the production of this sector has recently been estimated at about 100,000 tons of cheap filled soap, equivalent to about 50,000 tons of soap conforming to standard specifications.

Imports and exports.—Import of soap, except of some special grades like medicinal soaps, has been banned since 1951. Export of soap is being encouraged and it has been included as one of the items in various trade agreements. Exports, however, shrank from 2,470 tons in 1951-52 to 435* tons during the first ten months of 1955-56. The latter figure is negligible in comparison with the export target of 10,000 tons envisaged in the Plan. The prospects of expanding exports do not appear to be bright unless the cost of production of soap can be brought down considerably. The imports and exports of soap from 1950-51 onwards have been as follows :—

	Imports (Tons)	Exports (Tons)
1950-51	172	770
1951-52	120	2,470
1952-53	61	2,210
1953-54	27	624
1954-55	56	556
1955-56 (Ten months, April to January)	85	435*

*Provisional.

Assistance to the industry.—In order to assist the industry to obtain oils and fats, which constitute about 60 per cent of the raw materials required for the production of soap, at as low a price as possible, the Government of India took the following steps during 1951-53 :—

(a) The import duty on coconut oil was reduced from 43¾ per cent *ad valorem* to 31¼ per cent *ad valorem* while the preferential duty was reduced from 31¼ per cent *ad valorem* to 21 per cent *ad valorem* on imports from a British colony with effect from November 24, 1951.

(b) The import duty on palm oil was reduced from 43¾ per cent *ad valorem* to 10 per cent *ad valorem* while the preferential duty at 31¼ per cent *ad valorem* on imports from a British colony was abolished with effect from May 12, 1953.

The duty-free import of tallow was permitted for actual users, particularly the medium and small-sized units, whenever the prices of vegetable oils were higher than that of tallow.

Excise duty on soap.—Mainly on revenue considerations, with effect from March 1, 1954 an excise duty was levied on soap manufactured with the use of power. This duty has enhanced the competitive position of the cottage *vis-a-vis* the large and small-scale sector of the industry as factories producing less than 125 tons of household and laundry soap and 50 tons of other soaps in any financial year, are exempted from the levy.

With effect from March 1956 this duty has been extended to large manufacturers of soap not employing power. A lower duty and a higher limit of exemption have been provided in their case.

Recovery of glycerine.—With a view to bringing down the cost of production of soap and the recovery of a valuable by-product, the development of the glycerine industry was recommended in the First Plan. Two expansion schemes for the production of glycerine, *viz.*, the Vegetable Soap Works, Calicut and the Bharat Starch and Chemicals, Yamunanagar (Punjab), envisaged in the Plan, were completed in 1953. There was an increase in the capacity for the recovery of glycerine from about 6,300 tons in 1951 to 9,520 tons in 1955. A part of this extra capacity is due to assessment on the basis of 24 hours per day and 330 days per annum for all the units. As already stated, the Mysore Government Soap Factory have a scheme under implementation for the establishment of a glycerine recovery plant. The capacity proposed is 78 tons per annum which would raise the total capacity for the recovery of glycerine to about 9,600 tons.

The production of glycerine (crude) increased from about 4,900 tons in 1951 to 5,940 tons in 1955. The production of refined glycerine increased from about 2,400 to 2,510 tons during the same period.

II. Programme of Development in the Second Plan

Estimated requirements.—It is difficult to assess precisely the demand five years hence for a consumer commodity like soap as there are a number of uncertain factors which influence its consumption. Four principal factors which have to be taken into account are :—

(a) the expected 25 per cent increase in national income and the consequent improvement in living standards,

(b) the manner in which this increase will be distributed among different classes,

(c) the growth of urbanisation and industrialisation, and

(d) the improvement in water supply in the rural areas during the next five-year period.

Broadly speaking, a 25 per cent increase in national income may be expected to result in a similar increase in the consumption of soap. But the Second Plan aims at reducing the disparities in income between the rich and the poor and this is likely to result in a more than proportionate increase in the consumption of soap by the poorer classes. Moreover, with the emphasis on industrial development during the Second Plan a large number of people are expected to migrate from villages to cities and towns where the *per capita* consumption of soap is much more than in the villages. A provision of Rs. 91 crores has been made in the Second Plan for water supply and sanitation programmes in both the urban and rural areas as compared to about Rs. 42 crores for such programmes in the First Plan. The effect of the last three factors may result in another 25 per cent increase in the consumption of soap.

If the consumption of soap in 1955-56 is assumed to be about 200,000 tons, the demand in 1960-61 is likely to be of the order of 300,000 tons. This would mean an increase in the *per capita* consumption from about 18½ oz. in 1955-56 to 26 oz. in 1960-61 which is quite low as compared to some of the developed countries.

The popularity of synthetic detergents for washing rayon, silk, nylon, etc. and as industrial cleaning agents is also likely to increase during the Second Plan along with the consumption of soap. As these detergents supply a specific need for washing costly and special fabrics and are likely to be costlier than washing soap, it is not anticipated that their growing popularity will retard the consumption of soap. The estimated consumption of detergents may be 10 per cent of the total production of soap by the end of the Second Plan. There are also possibilities of their manufacture in the country from indigenous raw materials during the next five years.

There do not appear to be good prospects of large-scale exports of soap during the Second Plan. As already stated, the main obstacle is the high cost of production of soap. The subject was discussed with the representatives of the industry who were of the opinion that exports could perhaps be stepped up if the duties on imported raw materials were refunded on the exported product. The matter was subsequently examined in the Ministry of Commerce and Industry and it was found that there would be considerable administrative difficulty in determining whether imported or indigenous raw materials, for example, caustic soda and coconut oil, had been used in the manufacture of exported soap. An alternative method of evolving a procedure for working in bond under Section 100-A of the Sea Customs Act was also considered but some of the representatives of soap manufacturers who were consulted were of the opinion that carrying out the operations involved in the manufacture of soap in the presence of customs officers would be a very difficult task.

Targets of capacity and production.—As already stated, the capacity of the soap industry in 1955-56 may be estimated at about 340,000 tons. The All India Khadi and Village Industries Board have proposed the establishment of about 600 oil-*cum*-soap production centres in the villages for the production of about 17,000 tons of soap per annum to be achieved by 1960-61. The Board's programme is based on the utilisation of non-edible oils like *neem, karanjia, maroti,* etc. in the manufacture of soap.

This would give a total capacity of 357,000 tons which is considered sufficient to meet the demand for soap during the Second Plan period. The policy of not permitting any substantial expansion of the industry in the organised sector by the addition of new machinery followed in the First Plan may, therefore, be continued during the Second Plan.

Employment.—The increased utilisation of the existing capacity in the organised sector of the soap industry will not cause much improvement in the employment position in the industry. The development programme of the Khadi and Village Industries Board is, however, expected to provide employment for about 3,300 persons by 1960-61.

Requirements of raw materials.—To achieve a production of 300,000 tons of soap in 1960-61, the industry will require the following quantities of the principal raw materials :—

Oils and fats	140,000 tons
Caustic soda	22,500 ,,
Rosin	22,500 ,,

Among the oils and fats used, palm oil is at present wholly imported and substantial quantities of coconut oil are imported to supplement indigenous production. About 5,000 tons of imported tallow is used by small-scale manufacturers of soap. Caustic soda is partly produced within the country and partly imported.

The programme for increased cultivation of coconuts during the next five years is expected to make the country self-sufficient in coconut oil at the end of the Second Plan. Imports will, however, have to continue during the Plan period. The development programme for the caustic soda industry envisaged in the Second Plan should enable the requirements of the soap industry to be met from within the country to a considerably greater extent than at present.

The table below summarises the development of the soap industry in the Second Plan :—

		1955-56	1960-61
Capacity	('000 tons)	340	357
Production	(,, ,,)	200	300

32. TANNING AND FOOTWEAR

The leather and leather goods industries play an important part in the national economy by providing employment to a large number of workers and by earning valuable foreign exchange through the export of tanned hides and skins and leather footwear. The tanning of hides and skins and the manufacture of leather footwear are traditional village industries in India. Although large-scale factories have come into existence in important cities during the last few decades, the bulk of the tanning and footwear industry has remained a decentralised industry. The leather and leather goods industries are classified as follows :—

A. Tanning of hides and skins.

B. Manufacture of leather footwear.

C. Manufacture of other leather goods, *e. g.*, travel goods, industrial goods like belting, pickers, picking bands, etc.

This paper deals with the sections of the industry covered under (A) and (B) above.

A. TANNING

I. Review of Progress in the First Plan

Targets.— No definite targets of capacity or production were envisaged for the tanning industry in the First Plan. The demand for tanned hides and skins by the leather footwear industry was estimated to increase by about 800,000 pieces and 300,000 pieces respectively by the final year of the Plan.

High priority was accorded to fuller utilisation of the existing capacity of the large-scale tanneries which was expected to contribute an additional production of 2·5 million tanned hides a year (1·3 million vegetable tanned hides and 1·2 million chrome tanned hides) assuming operation at 90 per cent of the available capacity. The development of this industry was recognised as being generally limited by the shortage of raw hides in the country.

Capacity and production.—The tanning industry comprises the following four sections:—

(a) Organised tanneries producing finished vegetable and chrome tanned leather,

(b) Small-scale tanneries producing chrome tanned upper leather,

(c) Tanneries producing vegetable tanned leather known in the trade as E. I. tanned kips and skins, and

(d) Village tanneries producing vegetable tanned leather.

(a) *Organised tanneries.*—At the commencement of the First Plan, there were 26 organised tanneries producing vegetable tanned buffalo and cow leather, of which 16 also produced chrome tanned upper leather. Their annual rated capacity expressed in terms of cow hides (one buffalo hide=2 cow hides) was 3·184 million hides for vegetable tanning and 1·976 million hides for chrome tanning. Early in 1956, there were 24 such tanneries on the active list of the Development

Wing of the Ministry of Commerce and Industry with an installed capacity of 3·304 million hides for vegetable tanning; 13 of them also produce chrome leather with a capacity of 1·679 million hides. The State-wise distribution of this capacity is given below :—

State	Vegetable tanning		Chrome tanning	
	Number of units	Annual capacity (in terms of cow hides) (Numbers)	Number of units	Annual capacity (in terms of cow hides) (Numbers)
Uttar Pradesh	13	2,412,000	5	774,000
West Bengal	3	258,600	3	354,000
Madras	3	192,000	3	405,000
Bombay	2	130,800	1	86,400
Mysore	1	42,000	1	60,000
Bihar	1	201,000	..	..
PEPSU	1	67,200	..	..
TOTAL	24	3,303,600	13	1,679,400

The actual production has been considerably below the installed capacity, in fact, except for the year 1951, it has been less than 50 per cent of the capacity as can be seen from the following figures :—

Production of tanned hides (in terms of cow hides)

Year	Vegetable tanning (Numbers)	Chrome tanning (Numbers)
1950	1,514,400	495,600
1951	1,704,000	879,600
1952	1,478,400	650,400
1953	1,298,400	700,800
1954	1,370,800	668,000
1955	1,635,600	676,700

Although the production figures for 1955 are higher than those for 1950, it has not been possible to achieve in any significant measure fuller utilisation of the capacity as recommended in the Plan. The main reason for these low levels of production is the shortage of raw hides in the country.

The manufacture of glace kid, a product of high quality obtained by the tanning of goat skins, is carried out by three units, all located in Madras State. Their capacity is 1·8 million pieces a year which is negligible in relation to the available supplies of raw skins in the country. Bulk of the raw skin supplies is exported and the importance of glace kid industry lies, therefore, in utilising an indigenous raw material for earning valuable foreign exchange. The present production of glace kid is, however, much below the capacity because the largest unit, *i.e.*, The Chrome Leather Company, has almost closed down.

(b) *Small-scale chrome tanneries.*—There are about 250 small-scale chrome tanneries working on factory basis with the aid of power, located mainly in the Calcutta area and worked by the Chinese community. Accurate statistics of production in this sector are not available but it is generally estimated that their output is of the order of 1·5 million hides a year. Owing to the somewhat poor quality of raw hides used by these tanneries, the quality of upper leather produced by them is said to be inferior to that of the large-scale units.

(c) *Small-scale vegetable tanneries.*—There are about 500 small-scale vegetable tanneries situated mostly in South India depending almost entirely on manual labour. They process annually 8-9 million hides and 20-22 million skins for the production of vegetable tanned leather known to the trade as East India (E. I.) kips and skins. The product is generally lightly tanned and is semi-finished. A considerable part of the output is exported, mostly to the U. K. where it is further processed as required by the consumers, mostly footwear manufacturers. The quality of these tannages is not invariably uniform and up to customer's specifications. The Government is, therefore, considering the possibility of enforcing the shipment of E. I. tanned leather under **AGMARK** label accompanied by official certificates of grading. It has been suggested that E. I. tanned kips and skins should be further processed in the country and exported in the form of finished leather.

(d) *Village tanneries.*—The fourth section of the tanning industry, comprising village tanneries is spread throughout rural India. Although the share of this sector in the overall output of the industry is considerable, its dispersed nature makes it difficult to obtain accurate information about its capacity and production. It is generally estimated that this section of the industry processes 8-9 million hides and 3-4 million skins for the production of vegetable tanned leather.

Common production programme.—The position of the tanning industry was reviewed in May 1954 with a view to formulating a common production programme for the large and small sectors of the industry. It was observed that more than 50 per cent of the installed capacity of the organised tanneries was lying unutilised and that there had been no application either for the establishment of new factories or for the substantial expansion of existing factories. It was decided that, should there be an application for expansion in capacity of the organised sector of the industry, the All India Khadi and Village Industries Board should be consulted as to whether they could organise the work through the cottage sector.

Capital and labour.—Figures of capital and labour employed in the entire tanning and footwear industry are not available. According to the information supplied by the manufacturers registered under the Industries (Development and Regulation) Act, the total capital invested in the large-scale units manufacturing leather and leather goods is about Rs. 9·37 crores and the number of persons employed is about 9,400. According to the National Income Committee's Report (1954), the number of persons employed in the small-scale leather and leather manufacturing industry was 763,000 in 1950-51 which was about 6·6 per cent of the total labour force employed in all the small enterprises.

Imports and exports.—In order to assist the indigenous industry to raise its production, the following steps were taken by the Government by way of trade regulation :

(a) The export of raw hides and skins which are in short supply has been totally banned,

(b) The import of raw hides and skins has been allowed under O. G. L. from soft currency areas,

(c) The import of leather and leather goods has been severely restricted, and

(d) The export of leather and leather goods has been completely decontrolled.

To meet the internal requirements a large quantity of raw hides and skins are imported, mostly overland from Pakistan. In addition, a small quantity of tanned hides and skins and of unwrought leather is being imported. The import figures from 1950-51 onwards are given below:—

(Quantity in tons, value in Rs. lakhs).

	1950-51		1951-52		1952-53		1953-54		1954-55		1955-56 (Ten months, April to January)	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Hides, raw	4,620	1,25·1	3,740	79·1	3,040	50·8	2,900	56·5	4,810	75·3	6,970	1,15·2
Skins, raw	3,320	1,23·1	1,290	44·0	1,140	28·4	1,800	54·7	1,500	52·8	1,530*	51·0
Hides and skins, tanned or dressed.	74	1·8	..	..	..	..	N	N	18	0·7	1	0·1
Unwrought leather	954	4·6	1,334	6·6	1,393	6·9	2,151	8·8	2,086	6·8	1,771	5·5

*Provisional.

N—Negligible.

The tanning industry mainly the small-scale vegetable tanneries—has established a large export market for its products in the United Kingdom, U. S. A. and Pakistan. Besides, tanned hides and skins a large quantity of raw skins mostly goat skins are exported to Europe and the U.S.A. The declared export value of raw skins in December 1955 was about Rs. 6,650 per ton as compared to Rs. 16,450 per ton for tanned skins. These figures bring out the importance of developing the indigenous tanning industry with a view to reducing the exports of raw skins and expanding those of tanned skins. There has been practically no export of raw hides since 1952-53. The export figures for the last six years are given below :—

(Quantity in tons, value in Rs. lakhs)

	1950-51		1951-52		1952-53		1953-54		1954-55		1955-56 (Ten months, April to January)	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Hides, raw	1,970	68·5	1,250	61·8	70	2·3	..	..	N	N	..	..
Skins, raw	12,410	8,73·9	11,010	7,62·2	11,450	5,53·5	10,350	6,06·7	11,310	7,06·7	8,670	5,21·8
Hides and skins, tanned or dressed.	24,990	25,36·4	22,960	25,02·2	23,700	20,11·5	27,170	24,97·2	19,670	18,71·5	18,100*	18,59·3
Unwrought leather	159	38·0	515	39·2	576	15·7	467	22·4	476	16·2	286	13·9

*Provisional.

N—Negligible.

Raw materials.—The inadequate supply of raw hides has persisted during the First Plan period on account of the progressive decline in the slaughter of cattle in the country. The import of raw hides has gone up considerably during 1954-55 and the first ten months of 1955-56.

The supply of wattle bark from indigenous sources is still inadequate. During the first ten months of 1955-56 imports amounted to about 1,750 tons of various barks for tanning valued at about Rs. 33·1 lakhs, and to about 11,520 tons of wattle extract valued at about Rs. 69·1 lakhs. Efforts are being made to expand the plantation of wattle trees in the Nilgiris and the Palni areas in Madras State so as to make the country less dependent on foreign supplies of tanning materials. Two development schemes, started in 1949, were included in the First Plan. Up to the end of 1953-54 about 6,370 acres in the Nilgiris and 11,940 acres in the Palnis had been planted with wattle. On completion, these schemes are expected to yield annually about 11,000 tons of wattle bark as against the country's requirements of about 30,000 tons. Nursery and small-scale field tests are being carried out in Assam, Bombay, Orissa, Punjab, Uttar Pradesh and West Bengal for locating suitable areas for the planting of wattle trees. Systematic investigations with indigenous tanstuffs are also being carried out at the Central Leather Research Institute, Madras with a view to securing a better utilisation of the tanstuffs available in the country. The indigenously available *Karada* bark is stated to be showing good promise as a substitute for wattle bark.

Action on recommendations.—(a) It was recommended that long-range developments in the tanning industry should encourage the establishment of new units, wherever necessary, on the basis of industrial co-operatives. A large number of schemes of the State Governments were sanctioned by the Ministry of Commerce and Industry during the last few years for the development of the tanning and leather industry on small-scale basis.

A sum of over Rs. 7 lakhs was sanctioned to Uttar Pradesh in 1954-55 for the development of the leather flaying and tanning industry, Rs. 72,000 to Bombay State to provide aid to three tanning co-operative societies, and assistance was sanctioned also for the expansion of several small tanneries located in different States. In accordance with the development programme formulated by the Small Scale Industries Board, a few schemes for providing common service facilities were sanctioned in 1955-56, *e.g.*, Rs. 1 lakh for the establishment of a model tannery in Anantpur District of Andhra and Rs. 1·89 lakhs for the establishment of a tannery in PEPSU. Besides, the All India Khadi and Village Industries Board also drew up a development programme for the village leather industry with a view to encouraging co-operative societies in villages for the production of tanned hides and manufacture of leather goods. Considerable financial assistance has been sanctioned for starting flaying centres, training-*cum*-production centres, village model tanneries and village demonstration parties.

(b) *Improvement in techniques.*—It was recommended that the quality of finished leather should be improved by the introduction of better techniques and that the Government should make available to the small producers the necessary knowledge through demonstration parties and other measures. The Small Scale Industries Board has included the development of this industry in its programme which includes the introduction of improved tools and techniques through the establishment of about 200 model tanning units in the country.

Research.—The Central Leather Research Institute was opened at Madras under the administrative control of the Council of Scientific and Industrial Research in January 1953. The main function of this Institute is to assist the indigenous leather industry through fundamental and applied research, training of leather technologists and dissemination of technical knowledge. A number of tanning processes have been developed at the Institute for the manufacture of shoe upper leather like box and willow sides and glace kid, picking bands, upholstery leather, fancy leather, etc. A close liaison is maintained with the industry including the small and cottage sector and facilities are provided to tanners to finish their leather by modern equipment installed in the Institute. The Leather Research Committee under the Board of Scientific and Industrial Research is also sponsoring research covering several problems with special emphasis on the utilisation of indigenous tanstuffs. The establishment of Small Industries Service Institutes under the Ministry of Commerce and Industry is also expected to bring about an improvement in the quality of indigenous leather.

II. Programme of Development in the Second Plan

Estimated requirements and targets of capacity and production.—The principal outlets for leather in the country are the footwear industry and the manufacture of travel goods, fancy goods and industrial goods like belting, pickers, picking bands and roller skins. The largest consumption is, however, in the footwear industry. A considerable quantity of leather is also required for export.

Due to the paucity of reliable information about the production statistics of the entire tanning and footwear industry, it is difficult to estimate with precision the requirements of tanned hides and skins, current and by 1960-61. On the basis of an additional production of 13·5 million pairs of leather footwear envisaged by the last year of the Second Plan, the annual demand for tanned hides and skins is estimated to increase by about 2,000,000 pieces of the former and 750,000 pieces of the latter. Assuming the 1955 production of tanned hides and skins at about 46 million pieces (21 million hides and 25 million skins) and the exports to keep steady at the 1955-56 level during the Second Plan period, the demand in 1960-61 may be estimated at about 23 million hides and 26 million skins.

As the tanning industry can provide employment to a large number of people in the rural areas, which is one of the objectives of the Second Plan, the additional demand for tanned hides and skins during the next five-year period should be met, apart from fuller utilisation of the existing capacity in the organised sector, by initiating developments in the small-scale and cottage sector of the industry. Expansion of capacity in the organised sector should not, therefore, be normally allowed during the period of the Second Plan.

The development programme in the cottage and small sector of the tanning industry is expected to aim at raising the present extremely low level of technical efficiency of small tanners by providing common service facilities for improved tanning, finishing, etc. at well-equipped centres in addition to opening of flaying centres and small tanneries in rural and urban areas. To enable small tanners to take advantage of these facilities they are to be organised into co-operative societies. The programme of the All India Khadi and Village Industries Board in the Second Plan visualises the establishment of a large number of centres for carcass recovery, tanning, training-*cum*-production, and training-*cum*-demonstration.

Requirements of raw materials.—To achieve a production of 49 million tanned hides and skins (23 million hides and 26 million skins) in 1960-61, the industry will require the following quantities of the principal raw materials:—

Raw hides	23·5 million pieces	50 million pieces.
Raw skins	26·5 "	
Lime	28,000—33,000 tons	
Wattle bark and wattle extract	33,000 tons	
Other barks	330,000 tons	
Myrabolans	28,000—33,000 tons	

In view of the anti-cow slaughter legislation enacted or proposed to be enacted by the various State Governments, it is doubtful if the additional requirements of raw hides during the Second Plan period can be met from indigenous sources. Supplies will have to be secured from neighbouring countries. The other raw materials, except wattle bark, are available in the country. As already stated, attempts are being made to step up the plantation of wattle in Madras State.

B. FOOTWEAR

I. Review of Progress in the First Plan

Targets.—The Planning Commission estimated that the domestic requirements of leather footwear would rise from 85 million to about 90 million pairs per annum during the First Plan. Besides, exports were visualised at between 0·5 to 1·0 million pairs. Accordingly, the production target was envisaged at 91 million pairs to be achieved by 1955-56.

The additional demand for leather footwear was expected to be met by a fuller utilisation of the existing capacity of the large-scale factories and through the establishment of 100 new small-scale units, each with an outturn of 100 pairs per day, principally of the Indian type footwear.

Capacity and production.—In 1951 there were 9 large-scale leather footwear factories in India with an annual rated capacity of 4·724 million pairs of Western type footwear. In early 1956 there were 12 such units on the active list of the Development Wing of the Ministry of Commerce and Industry with an annual capacity of 5·975 million pairs. There has been no real increase in the capacity, only some units already in existence came within the purview of the Industries (Development and Regulation) Act, 1951 and were registered. The regional distribution of the existing capacity is tabulated below :—

Western Type Footwear

State	Number of units	Annual capacity (pairs)
Uttar Pradesh	7	2,277,000
West Bengal	1	3,442,600
Bihar	1	174,200
Madras	1	75,000
PEPSU	1	4,800
Mysore	1	1,200
TOTAL	12	5,974,800

The capacity of these factories for Indian type footwear, which are hand-made, fluctuates with demand.

The production of the large-scale factories from 1950 onwards is given below :—

Year	Western type ('000 pairs)	Indian type ('000 pairs)
1950	2,837	1,997
1951	3,641	2,074
1952	3,367	1,806
1953	3,348	2,204
1954	3,268	2,063
1955	3,243	2,303

Reliable production figures for the small-scale and cottage units, which are responsible for manufacturing more than 90 per cent of the total output, are not available and hence a regular study of the production trends is not possible. The present output of leather footwear by the cottage and small-scale sector is estimated at 77-83 million pairs per annum (12-13 million pairs of Western type and 65-70 million pairs of Indian type footwear).

Common production programme.—The position of the leather footwear industry was reviewed along with the tanning industry in May 1954 with a view to formulating a common production programme for the large and small-scale sectors of the industry. It was decided that a watch should be kept on the production of organised factories to see if any increase in their production was being effected at the cost of cottage and small-scale units. It was also decided that the All India Khadi and Village Industries Board should be consulted with reference to proposals for expansion of the capacity of units in the organised sector of the industry.

Imports and exports.—There have been very small imports of leather footwear during the Plan period whereas the exports have gone up appreciably, particularly during the last two years of the Plan. Imports and exports of leather footwear from 1950-51 onwards have been as follows :—

(Quantity in pairs, value in Rs.)

Year	Imports		Exports*	
	Quantity	Value	Quantity	Value
1950-51	1,460	23,400	667,500	31,73,300
1951-52	2,280	9,800	1,465,500	1,22,20,300
1952-53	225	2,500	1,027,100	1,19,29,600
1953-54	465	11,800	1,218,600	93,37,600
1954-55	1,490	34,200	1,570,400	81,59,000
1955-56 (Ten months, April to January)	1,610	48,400	1,236,200	71,25,100

* Prior to April 1952 the exports of leather footwear were reported among boots and shoes other than rubber soled with canvass uppers. Since April 1, 1952 these have been separately specified.

As is evident from the figures tabulated above, the export target has been exceeded during each year of the Plan.

Action on major recommendations.—It was recommended that permission should not normally be given for the establishment of new large-scale factories or for the substantial expansion of existing factories engaged in the manufacture of leather footwear. The additional demand for leather footwear was to be met by a fuller utilisation of the existing capacity of the large-scale factories and through the establishment of 100 new small-scale units.

No license was granted under the Industries (Development and Regulation) Act, 1951 for expansion of capacity in this industry during the period of the Plan. On the other hand, the Central Government have provided considerable sums as loans and grants to the State Governments for implementing specific schemes for the development of the leather footwear industry in the cottage and small-scale sector. It is not known how many new small units have actually come into existence as a result of this financial assistance. A few of the schemes sanctioned are Rs. 31,000 for the development of co-operative organisation among *mochies* in Madhya Bharat, Rs. 1·04 lakhs for the establishment of service centres for cottage footwear industry and Rs. 72,900 for the establishment of a model footwear unit in Madras.

Excise duty on footwear.—An excise duty of 10 per cent *ad valorem* has been imposed on footwear since March 1, 1954. Only power-operated factories employing 50 or more workers and using more than 2 H. P. fall within the purview of this levy.

II. Programme of Development in the Second Plan

Estimated requirements.—It is difficult to estimate the requirements of leather footwear as there is no reliable information about the actual production in the cottage and small-scale sector of the industry. Assuming an estimated output of 83 million pairs in this sector, the total availability during 1955 works out to about 88·5 million pairs of which about 1·5 million pairs were exported.

As regards the present pattern of demand in the urban and rural areas (urban population 67·2 millions and rural population 316·8 millions according to the ratio disclosed in the 1951 Census) it is roughly estimated at one pair per annum for every two persons in the former and one pair for every five persons in the latter. This indicates that there is a wide disparity in the use of footwear between the urban and rural areas and that it is primarily through increased off-take in the latter that any significant stimulus could be given to footwear manufacture. This would, however, depend on a considerable change in the habits of the rural population which may not come about strictly in step with the increase in the *per capita* income in rural areas. The Second Plan envisages a 25 per cent rise in national income and about 20 per cent increase in total consumption or 12-13 per cent increase in *per capita* consumption during the five-year period. A 20 per cent increase in consumption would raise the domestic requirements of leather footwear to about 104·5 million pairs in 1960-61, and a 15 per cent increase to about 100 million pairs. It would probably be reasonable to adopt the latter figure for suggesting a production target for leather footwear in the Second Plan.

If exports are envisaged at 2 million pairs, the total requirements of leather footwear in 1960-61 would be 102 million pairs, *i.e.*, an increase of 13·5 million pairs over the 1955 level.

Targets of capacity and production.—In view of the fact that the leather footwear industry can be organised on a labour intensive basis and a large expansion of employment opportunities is one of the principal objectives of the Second Plan, no expansion of capacity in the large-scale sector of the industry is envisaged during the five-year period. The additional demand for footwear is expected to be met by a fuller utilisation of the existing capacity in the organised sector and by developments in the cottage and small-scale sector.

With a view to assisting the cottage and small-scale sector of the industry to meet the additional demand, it is proposed that financial assistance should be extended by the Government in the form of loans to workers to enable them to become shareholders of co-operative societies and also for the purchase of improved equipment and working capital. The programme of the All India Khadi and Village Industries Board aims at assisting about 35,000 cobblers who will be assured a regular supply of raw materials and sale of their products at reasonable prices. It is proposed by the National Small Industries Corporation to open a wholesale depot for leather footwear at Agra to assist the industry in marketing its products.

Requirements of raw materials.—The leather footwear industry will require the following quantities of the principal raw materials for achieving a production of 102 million pairs in 1960-61 :—

Leather	12·25 million tanned hides and 4·75 million tanned skins.
Thread	5·4 million reels for uppers and 360 tons for others.
Eyelets	285 million pieces.

The table below summarises the development programme for the tanning and footwear industry in the Second Plan :—

Production	1955-56	1960-61
(*a*) Tanned hides and skins (million pieces)	46·0	49·0
(*b*) Leather footwear (million pairs)	88·5	102·0

33. RUBBER MANUFACTURES

The rubber goods manufacturing industry which produces a large number of different useful products, is of comparatively recent origin. Though rubber manufactures are used in a wide range of industries and for many purposes, it is principally the new agencies of transportation motor vehicles, bicycles, etc. which have led to the great expansion of the rubber goods industry. The industry makes a vital contribution to defence by producing the tyres etc. for military vehicles and aircraft. The demands for these purposes were so heavy during the Second World War that natural supplies of raw rubber had to be augmented in countries like the U.S.A. by synthetic rubber.

India is one of the very few countries having a raw rubber producing industry plantation industry co-existing with a modern rubber manufacturing industry. Till 1920, the country was wholly dependent on imports for every item of rubber manufactured goods. In that year, the first factory for the manufacture of water-proof fabrics was started. The real beginning of the industry, however, can be said to have taken place during 1930, when the International Rubber Restriction Scheme came into force restricting rubber exports from the main producing countries and thereby gradually bringing about a rapid improvement in the world price of raw rubber. The internal price of rubber in India, however, continued to be low, which provided a considerable advantage to local rubber manufacturers. During this period a few of the large foreign manufacturers also set up subsidiary factories in India. The Bata Shoe Company began operations in the country in 1933; the Dunlop Rubber Company started a tyre factory in Bengal in 1935 and the Firestone Tyre and Rubber Company started the second tyre factory in 1939. In addition, a large number of small rubber factories came into being in this period, most of which began to produce rubber footwear with Japanese equipment and technicians. Many more small factories were also started on a cottage basis. The variety of goods produced also increased and included such items as hoses, sheeting, cycle and cab tyres, moulded goods, etc. The period of the World War II witnessed considerable expansion of the industry, particularly the manufacture of tyres, railway and mechanical goods, rubber footwear and rubber covered cables. At present, the variety of rubber goods manufactured covers almost the entire range of requirements of the country. During recent years, it has also been possible to develop an export market for rubber goods in some of the neighbouring countries.

The rubber manufacturing industry produces a large variety of goods which may be classified as follows :—

(i) Tyres and tubes of all kinds.

(ii) Footwear.

(iii) Water-proof rubberised fabrics.

(iv) Ebonite rods and sheets.

(v) Latex foam cushioning and sponge.

(vi) Hoses of all types.

(vii) V-belts and Fan belts.

(viii) Rubber conveyor belting.

(ix) Mechanical rubber goods.

(x) Miscellaneous.

Of these, the most important item which accounts for 65-70 per cent of the total consumption of rubber and bulk of capital investment is the manufacture of tyres and tubes. The rubber footwear industry probably comes next in importance with an average annual consumption of rubber of nearly 4,000 tons or 15 per cent of the total consumption. In the case of the majority of these items, with the exception of tyres and tubes, considerable surplus capacity exists in the country and their manufacture can be expected to develop further in the normal course with an increase in demand. In formulating, therefore, the development programme for the industry, detailed consideration has to be given mainly to two of the major items, namely tyres and tubes.

A. Rubber Tyres and Tubes

I. Brief Survey of the Industry

Location, rated capacity and production. The main types of tyres and tubes that are produced in the country are (i) giant, (ii) passenger, (iii) tractor, (iv) aero and (v) bicycle. The Dunlop Rubber Company and the Firestone Tyre and Rubber Company are the only two manufacturers of automobile tyres and tubes. The Dunlop Rubber Company produces in its works at Shahganj not only tyres and tubes of its own make, but also those of the Good Year Tyre and Rubber Company and the India Tyre and Rubber Company. The factory of the Firestone Tyre and Rubber Company is located in Bombay. These units produce all the above varieties of tyres and tubes and, between them, account for the entire production of giant, passenger, tractor and aero tyres and tubes and more than 90 per cent of bicycle tyres and tubes. The other units producing bicycle tyres and tubes are the National Rubber Manufacturers, Calcutta, the R. B. S. Jain Rubber Mills, Howrah, the Indian Rubber Goods Manufacturing Co., Calcutta and the Travancore Rubber Works, Trivandrum.

The present installed capacity of the industry for different types of tyres and tubes and actual production in recent years are as follows :—

	Number of units	Annual capacity*	Production 1952	1953	1954	1955
		Numbers	Numbers	Numbers	Numbers	Numbers
1. Giant tyres	2	583,400	516,829	551,354	600,636	613,191
2. Giant tubes	2	563,400	410,645	426,664	476,462	514,014
3. Passenger tyres	2	337,800	204,861	216,545	224,000	269,120
4. Passenger tubes	2	361,800	242,014	231,815	277,018	271,509
5. Tractor tyres	2	26,136	3,848	9,615	19,154	24,526
6. Tractor tubes	2	23,976	5,488	8,131	16,881	23,110
7. Aero tyres	2	6,600	689	1,292	3,511	4,408
8. Aero tubes	2	5,700	679	525	1,596	2,444
9. Bicycle tyres	6	6,029,500	4,180,560	4,645,025	5,226,005	5,748,100
10. Bicycle tubes	5	8,127,900	4,166,581	4,600,698	5,576,901	5,563,777

* Capacity is estimated on the basis of three-shift operation.

The production of all varieties of tyres and tubes has shown an increase over the level in 1952. The rise in production is in tune with the growth of the automobile and bicycle industries. Some of the new items which have been taken up for manufacture in recent years are earth mover and excavator tyres and tubes. Particularly significant is the rapid increase in the production of tractor and aero tyres and tubes.

Rubber tyres and tubes are subject to excise duty at 30 per cent *ad valorem* for tyres and tubes of motor vehicles and 15 per cent *ad valorem* for all other types. Tyres specially designed for use on animal drawn vehicles are, however, exempted from payment of duty.

Capital and labour.—The capital investment (paid-up capital plus borrowings) of the two important manufacturers *viz.*, the Dunlop Rubber Company and the Firestone Tyre Company is placed at about Rs. 8·55 crores. The total investment in the rubber goods industry as a whole is roughly estimated at about Rs. 13 crores. On the eve of the First Plan (July 1950), the Dunlop Rubber Company raised a debenture loan of Rs. 1·3 crores at 5 per cent interest to finance its development programme.

The number of persons employed in the industry is about 21,800.

Imports and exports.—With the development of the rubber manufacturing industry a healthy change has taken place in the pattern of India's rubber trade with other countries. Before World War II, India was exporting considerable quantities of raw rubber and importing most of the rubber manufactured goods required in the country. At present, the export of raw rubber has not only been stopped but limited quantities are imported to supplement indigenous production. On the other hand, rubber manufactured goods are exported to neighbouring countries and imports are very small. The quantities of rubber and rubber manufactured goods imported and exported in recent years are indicated below :—

Imports

			1951-52	1952-53	1953-54	1954-55	1955-56 (Ten months, April to January)
Raw rubber	Quantity	(Tons)	4,984	3,381	665·3	4,689·5	5,529
	Value	(Rs. lakhs)	245·8	92·6	8·8	103·5	156·5
Pneumatic tyres	Quantity	(Numbers)	8,715	5,013	9,835	10,158	9,193
	Value	(Rs. lakhs)	20·3	11·6	33·3	23·9	22·5
Pneumatic tubes	Quantity	(Numbers)	8,654	3,557	6,937	10,064	8,731
	Value	(Rs. lakhs)	2·6	0·9	2·2	2·8	2·1
Bicycle tyres	Quantity	(Numbers)	16,740	142	Nil.	2,726	11,919
	Value	(Rs. lakhs)	0·7	Negligible.	Nil.	0·1	0·5
Bicycle tubes	Quantity	(Numbers)	13,916	1,582	Nil.	4,924	13,750
	Value	(Rs. lakhs)	0·3	Negligible.	Nil.	0·1	0·3
Solid rubber tyres	Quantity	(Numbers)	139	890	142	384	1,873
	Value	(Rs. lakhs)	0·2	1·7	0·4	0·3	7·1
Other manufactures (excluding apparel, boots and shoes).	Value	(Rs. lakhs)	28·0	39·0	12·1	26·1	14·7
TOTAL		(Rs. lakhs)	297·9	145·8	56·8	156·8	203·7

Exports

			1951-52	1952-53	1953-54	1954-55	1955-56 (Ten months, April to January)
Raw rubber	Quantity	(Tons)	149	93	58·3	21	..
	Value	(Rs. lakhs.)	9·5	4·3	2·5	0·85	..
Pneumatic tyres	Quantity	(Numbers)	76,169	142,034	401,614	326,123	109,934
	Value	(Rs. lakhs)	54·0	122·6	150·0	103·7	52·9
Pneumatic tubes	Quantity	(Numbers)	89,451	71,408	125,759	111,527	71,524
	Value	(Rs. lakhs)	8·5	9·7	12·6	6·8	3·6
Solid rubber tyres	Quantity	(Numbers)	34,331	1,990	228	144	65
	Value	(Rs. lakhs)	24·0	Negligible	0·1	Negligible	1·2
Other manufactures (except apparel, boots and shoes).	Value	(Rs. lakhs.)	19·8	9·9	11·0	11·5	10·8
TOTAL		(Rs. lakhs)	115·8	146·5	176·2	122·85	68·5

The break-up of exports in terms of automobile tyres and tubes and cycle tyres and tubes is not available for land-borne trade. The sea-borne export of tyres and tubes, automobile and cycle separately, have been approximately as follows :—

	1952-53	1953-54	1954-55	1955-56 (Ten months, April to January)
	(Numbers)	(Numbers)	(Numbers)	(Numbers)
Automobile tyres	74,000	108,000	83,000	46,000
Automobile tubes	57,000	68,000	55,000	22,000
Cycle tyres	68,000	294,000	243,000	65,000
Cycle tubes	15,000	58,000	56,000	50,000

As regards future exports, it is difficult to make a forecast since the South-East Asian Countries (Indonesia, Ceylon, Malaya) have abundant supplies of raw rubber, an important point in their favour for establishing a rubber goods manufacturing industry. However, on the basis of present trends and an optimistic approach to the future, export targets of 150,000 each of automobile tyres and tubes and 300,000 of each of bicycle tyres and tubes are envisaged for the Second Plan.

Raw materials.—Raw rubber which forms the main raw material for the industry is produced in South India chiefly in the State of Travancore-Cochin. Although the production of rubber has steadily increased in recent years--the production was 17,000 tons in 1951, 20,000 tons in 1952, 21,000 tons in 1953, 21,500 tons in 1954 and 22,500 tons (estimated) in 1955—it has not kept pace with the requirements at current levels of production of rubber goods. The present annual demand for rubber is estimated to be about 30,000 tons and compared to the estimated production of rubber in 1955, this would leave a deficit of nearly 7,000 tons. This deficit is generally met by imports. The price of raw rubber is fixed by the Government—the present price is Rs. 155-12-0 per 100 pounds of grade I quality of rubber--on the basis of periodic reviews of the average cost of production. In the interest of developing the rubber industry on a long-term basis and protecting it from the uncertainties of highly fluctuating international market, unrestricted import or export of raw rubber is not permitted. Imports are allowed only on a quota basis depending on the anticipated demand and availability of indigenous rubber in each year.

The other raw materials required by the industry are carbon black, sulphur, lithopone, zinc oxide, clays and barytes, tyre cord, automobile and bicycle valves, bead-wire, accelerators, anti-oxidents and other allied chemicals. Almost all these raw materials are at present imported.

Fair prices of rubber tyres and tubes.—While the price of raw rubber has been periodically reviewed and fixed by the Government, no control was exercised over the prices of rubber tyres and tubes. This led to frequent complaints that the prices charged for rubber tyres and tubes by the manufacturers were excessive and the consumer did not receive the benefit of the controlled prices of raw rubber. The Government of India, therefore, decided that an enquiry should be made into the prices of rubber tyres and tubes manufactured in the country and the Tariff Commission was accordingly requested to conduct the necessary enquiries and submit their recommendations on :—

(i) what should be the fair prices of tyres and tubes manufactured by several producers; and

(ii) whether the prices charged by them from time to time for the products since 1946 have been fair or excessive in relation to the costs entering into the manufacture of these products.

The Tariff Commission completed its enquiries in 1955. The more important observations and recommendations made by the Commission are :

(1) the prices of tyres and tubes during 1946 to 1953 were excessive in relation to the costs (the actual prices of tyres and tubes were in excess of the fair prices determined by the Commission by amounts which varied from 21·79 per cent to 6·88 per cent);

(2) tyres and tubes of all make are sold at uniform prices, there being no competition among the producers so far as prices are concerned. The complete elimination of price competition results in excessive reliance being placed on publicity, personal liaison and service attractions of various sorts leading to a competitive increase in selling and distributing expenses. While price competition benefits the consumer, the kind of competition that prevails among the tyre companies leads to a growing burden being placed on the consumer. Government should, therefore, exercise a strict control over selling and distributing expenses incurred by the tyre companies;

(3) the industry is so organised that the individual units are not in a position to engage in any price competition with each other and have therefore, to act in unison so far as prices are concerned. Consequently, there is as much justification for exercising State control over the price policy of the tyre industry as there would have been if the industry has been organised on a fully monopolistic basis. In the absence of such control, it would be difficult to ensure that the prices of tyres and tubes are maintained in fair relation to costs;

(4) as regards fair prices for the future a judicious system of control based on uniform selling prices will adequately safeguard the interests of the consumer without interfering with the continued expansion of the industry.

The Commission has estimated the fair prices of different types of tyres and tubes and recommended that these prices should remain in force till December 31, 1957 subject to a formula for adjustment on account of variations in the cost of raw rubber, fabric and carbon black. Prices for original equipment and for Government purchase should, however, continue to be fixed by negotiations as at present. Further, no control need be exercised over export prices. The Government accepted these recommendations and the tyre companies were called upon to issue a revised price list with effect from October 10, 1955.

The Commission has also made the following ancillary recommendations :—

(a) the Government should explore the possibility of securing imports of tyres and tubes with a view to providing some measure of competition to the Indian companies;

(b) (i) a pilot project should be started for the manufacture of tyres and tubes and (ii) special assistance should be offered to Indian enterprises wishing to enter this field either independently or in collaboration on reasonable terms with foreign enterprises;

(c) the Government should examine the desirability of securing larger participation of Indian capital in the tyre companies operating in India in order that the benefit accruing to the national economy from the manufacture of tyres and tubes may be enhanced through the retention in the country of a larger proportion of the profits earned in this business.

These recommendations are being examined by the Government.

II. Programme of Development in the Second Plan.

Estimated requirements.—On the basis of present production figures the demand for rubber tyres and tubes including export requirements in 1955-56 may be estimated as follows :—

Automobile tyres	900,000.
Automobile tubes	800,000.
Bicycle tyres	6 millions.
Bicycle tubes.	6 ,,

The demand for tyres and tubes during the Second Plan period is closely related to the programme of development envisaged for the automobile and bicycle industries. Account has also to be taken of the export targets suggested for these items.

(i) *Bicycle tyres and tubes.*—Bicycle tyres and tubes are required (*a*) as original equipment for new cycles and (*b*) for replacement purposes. The production of bicycles in 1955-56 is estimated at about 550,000 so that the demand for bicycle tyres and tubes as original equipment for new cycles during this year, may be placed at about 1 million each. Since the total demand for cycle tyres and tubes in 1955-56 is estimated at 6 millions each, it may, therefore, be assumed that the balance of about 5 million tyres and tubes were used for replacement purposes (the export of bicycle tyres and tubes in 1955-56 is small and therefore may be neglected). The programme for the bicycle industry envisages a substantial increase in the production of bicycles to 1·25 millions by 1960-61. Consequently, the demand for bicycle tyres and tubes will rise very considerably. Corresponding to a production of 1·25 million cycles, the requirements of bicycle tyres and tubes as original equipment will be 2·5 millions in 1960-61. Apart from this, the additional replacement requirements consequent on a gradual increase in the number of cycles on roads also has to be taken into consideration. The demand arising on this account is estimated to go up from 5 million tyres and tubes in 1955-56 to about 9 millions in 1960-61 on the basis of an average replacement demand of 1·2 tyres and tubes per cycle per annum. Including the requirements of 0·3 million for exports the total demand for bicycle tyres and tubes is thus estimated at 11·8 millions by 1960-61.

(ii) *Automobile tyres and tubes.*—The demand for automobile tyres and tubes in 1955-56 is estimated at 900,000 and 800,000 respectively. The production of automobiles during the year is estimated to be about 23,100 comprised of 10,300 cars and 12,800 trucks. The demand for automobile tyres and tubes as original equipment for these vehicles may be reckoned at about 141,100. The export of automobile tyres and tubes in 1955-56 is likely to be about 60,000 each. Thus it would seem that the balance of about 700,000 tyres and 600,000 tubes out of the total estimated consumption in 1955-56 has been utilised for replacement purposes.

The targets of production envisaged by 1960-61 for automobiles and the corresponding requirements of tyres and tubes as original equipment are indicated below :

Production of vehicles in 1960-61		Requirements of tyres and tubes	
Cars	12,000	Passenger tyres	60,000
Trucks	40,000	Giant tyres	280,000
Jeeps and station wagons	5,000	Jeep and station wagon tyres	25,000
Tractors	6,000	Tractor tyres	24,000
Motor cycles and scooters	11,000	Motor cycle and scooter tyres	22,000
		TOTAL	411,000

In addition to the requirements indicated above, provision will also have to be made for a substantial increase in the replacement requirements of automobile tyres and tubes. Although it is difficult to estimate accurately the growth of demand on this account, it may be expected to increase to about 900,000 tyres and tubes by 1960-61. Including the export requirements of 150,000 tyres and tubes the total demand for automobile tyres and tubes of all varieties may thus be estimated at about 1·46 millions by the end of the Second Plan period.

(iii) *Tyres and tubes for animal-drawn vehicles.*—The present demand for tyres and tubes for animal-drawn vehicles is negligible. If, however, it is decided to replace the existing steel tyres of these vehicles by pneumatic tyres it would provide scope for a substantial expansion in the production of tyres and tubes to meet the considerable requirements of bullock driven vehicles. The desirability of making such a change has been mentioned often in the past although in view of the economic condition of the agriculturist, it seems doubtful if any large-scale change-over would be possible in the near future. A proposal for subsidising the conversion of about 1 lakh professional type (public carrier) bullock carts with iron tyres into pneumatic tyre carts is at present under the consideration of the Ministry of Transport. Although this will provide in the long run a new line of production of considerable potentiality, the demand that is likely to materialise in the immediate future is still uncertain. This demand is not, therefore, taken into account for the purpose of estimating the requirements of tyres and tubes during the Second Plan period.

Schemes licensed and under implementation.—The following schemes for the manufacture of tyres and tubes have been licensed :—

	Additional or new capacity per annum (Numbers)
Bicycle tyres :	
1. National Rubber Manufacturers, Calcutta	2,400,000
2. Dunlop Rubber Co., Calcutta	447,000
3. Associated Rubber and Plastic Works, Calcutta	240,000
4. South India Rubber Works, Bombay	900,000
TOTAL	3,987,000
Bicycle tubes :	
1. National Rubber Manufacturers, Calcutta	1,200,000
2. South India Rubber Works, Bombay	900,000
3. Associated Rubber and Plastic Works, Calcutta	120,000
TOTAL	2,220,000

No schemes have been licensed for the manufacture of automobile tyres and tubes but capacity for the manufacture of certain new types of tyres and tubes is proposed to be expanded. Both the Dunlop Rubber Works and the Firestone Tyre and Rubber Company have been licensed to manufacture tyres and tubes required for earth moving equipment. The latter have already completed their scheme. The total capacity for earth mover tyres and tubes when the scheme of the Dunlop Rubber Works is also completed, will be 4,200 per annum.

Targets of capacity and production.—On the completion of the schemes so far licensed, the capacity of the industry for the main categories of tyres and tubes will be as follows :—

Bicycle tyres	10·0	millions
Bicycle tubes	10·3	,,
Automobile tyres	0·95	,,
Automobile tubes	0·95	,,

The capacity expected to be achieved on the basis of the licences issued thus falls short of the anticipated requirements during the Second Plan period. The gap between capacity and estimated demand for different items is approximately as below :—

Automobile tyres	500,000	
Automobile tubes	500,000	
Bicycle tyres	1·8	millions
Bicycle tubes	1·5	,,

Having regard to the essential nature of rubber tyres and tubes which are of considerable importance both from industrial and strategic considerations, it is necessary to aim at achieving self-sufficiency for these goods during the Second Plan period. In the case of automobile tyres and tubes, the additional capacity required is sufficiently large to justify the establishment of a new unit. In this connection it is necessary to consider carefully the relative advantages of different locations from the point of view of availability of raw materials and the current and future demands in different regions of the country. The two existing factories are located in Bombay and Calcutta. *Prima facie*, any new unit would appropriately have to be located in South India. This will also have the advantage of being in proximity to sources of one of the important raw materials, namely, raw rubber which is produced in Travancore-Cochin.

As regards bicycle tyres and tubes which lend themselves to decentralised production, further capacity can be envisaged by way of both the expansion of some of the existing units and the establishment of one or more new units at different locations. In this connection it may be mentioned that the present production is largely concentrated in the Calcutta region. Proposals for putting up new units in other regions have, therefore, to be favourably considered. At present the Travancore Rubber Works have under consideration an expansion programme to increase their capacity for bicycle tyres and tubes.

The expansion of capacity corresponding to the anticipated requirements for different types of tyres and tubes is estimated to involve a capital outlay of about Rs. 4 crores. It will provide additional employment to about 7,000 persons.

Requirements of raw rubber and other raw materials.—Raw rubber is the most important raw material for the industry. The consumption of raw rubber is expected to go up considerably as a result of the expansion of the rubber goods industry in the Second Plan period. As against the present consumption of about 30,000 tons it is estimated that the demand for raw rubber may increase to over 40,000 tons by 1960-61. Even at present limited quantities of raw rubber are imported and unless the production of raw rubber in the country is substantially stepped up this demand may have to be met increasingly by way of imports. It is, however, possible to increase the production of rubber within the country by a proper programme of replantation in existing areas and the extension of cultivation to new areas. The Government have already approved a scheme for subsidising the replantation of 70,000 acres with better yielding varieties of rubber during the next 10 years. As a result of this scheme the production of rubber is expected to go up to about 36,600 tons by about 1974. Further expansion in production is also envisaged by the extension of cultivation to new areas. During the next five years it is proposed to bring an additional 10,000 acres under cultivation of better yielding varieties of rubber at the rate of 2,000 acres per year. This scheme is expected to yield an additional production of a little over 3,000 tons of rubber by 1974. Thus in all about 40,000 tons of raw rubber are expected to be produced by about 1974. This long-term programme will not, however, materially augment the production of raw rubber in the immediate future. Its benefits are expected to accrue only from the Third Plan period onwards. During the Second Plan period, no substantial increase in rubber production over the present level of 23,000 tons is anticipated. Thus the supplies of raw rubber from indigenous sources will be far short of the anticipated requirements during the Second Plan period. Additional measures for supplementing the production of raw rubber have, therefore, to be considered.

The supply of raw rubber could be augmented to some extent if adequate measures are taken to reclaim rubber from discarded rubber products and rubber scrap. Reclaimed rubber has been used extensively in other countries to bridge the gap between supply and demand. At present in India, only small quantities of reclaimed rubber are produced by some of the larger units for their own use. Old and worn-out tyres constitute the most important scrap available to the industry. These are, however, used extensively in the manufacture of footwear where they command a high price. Collection of adequate quantities of scrap rubber, at reasonable prices in any one locality to start an economic unit has not been found to be feasible at present. This, it has been stated, makes the establishment of a unit for the production of reclaimed rubber an uneconomic proposition. While therefore the shortage of natural raw rubber justifies the establishment of an indigenous unit for the production of reclaimed rubber, before such a project can be taken up it will be necessary to undertake careful investigations regarding the cost of production, availability of scrap supplies at site and transport facilities.

In certain advanced countries and particularly in the U.S.A. synthetic rubber has replaced natural rubber to a considerable extent. Although synthetic rubber does not possess all the desirable qualities of natural rubber, the former is superior to the latter in certain specific properties and is therefore preferred for the manufacture of specific products. The supplies of natural rubber can be supplemented by suitably mixing synthetic rubber with natural rubber in different proportions. The gap between requirements and supplies of natural rubber can be substantially covered if a synthetic rubber plant with a capacity of about 15,000 to 20,000 tons per annum could be established. Such a plant can possibly be conceived on the basis of alcohol and benzene as its primary raw materials. However, it is necessary to examine in detail various aspects such as the process of manufacture and cost of production before a synthetic rubber plant can actually be established. In this connection certain preliminary investigations have been undertaken by the Ministry of Commerce and Industry in connection with the development projects to be processed by the National Industrial Development Corporation.

While the establishment of synthetic and/or reclaim plants will ultimately improve the supplies of rubber from indigenous sources, it is evident that in the immediate future increasing imports have to be allowed to meet the requirements. In allowing such imports, the quotas to be allotted for synthetic rubber, natural rubber and reclaimed rubber out of the total provision for imports of rubber have to be determined in periodic consultation with the industry.

Carbon black is another essential raw material for the industry. It is produced in two principal grades, namely, channel black and furnace black both of which are required by the tyre industry. At present only furnace black is produced in small quantities by one firm, the D. Waldie & Co. As against the present demand of about 7,000 tons per annum, the annual capacity of the plant of the D. Waldie & Co., is only 1,000 tons. The requirements of carbon black are estimated to go up to 12,000 tons per annum by 1960-61 and so the production of carbon black demands immediate attention. Preliminary investigations on the possibility of setting up a plant for the manufacture of carbon black have been undertaken by the National Industrial Development Corporation. It is envisaged that a plant having a capacity of 20 million lbs. (about 8,900 tons) per annum will be set up during the Second Plan period. It may be necessary to obtain foreign collaboration for this enterprise in view of the complicated technical know-how involved in the production of carbon black. The cost of the project is provisionally estimated at Rs. 1·5 to 2 crores.

Tyre cords are required in large quantities by the rubber tyre industry. With the advent of fibres like rayon and nylon there has been a shift in favour of rayon and nylon cords in place of cotton cords hitherto used. At present rayon and nylon cords are entirely imported. Proposals for its manufacture have to be encouraged.

In regard to bead wire required by the tyre industry, the indigenous production is not sufficient to meet the requirements. At present bead wire is produced by the Indian Steel and Wire Products but its quality is reported not to be quite satisfactory. The requirements of bead wire are estimated at about 4,000 tons in 1960-61. It is necessary to step up the production of bead wire to meet the whole of these requirements from indigenous sources.

Automobile and cycle valves are not produced in the country. A scheme with a limited capacity has recently been licensed.

Miscellaneous.—Considerable importance is attached in foreign countries to improving the technology of tyre manufacture and all the leading tyre manufacturers have set up their own research establishments for this purpose. Reference has often been made in the past to the need for starting a research institute in this country where investigations could be conducted on improvements in the technique of production of rubber goods. The Tariff Commission has also recommended the establishment of a pilot project for the manufacture of tyres and tubes. This is a matter which should be carefully considered for implementation during the Second Plan.

Imports of tyres and tubes are at present negligible. The Tariff Commission has recommended that the Government should explore the possibility of securing imports of tyres and tubes with a view to providing some measure of competition to the Indian Companies. It is considered that such a move will result in the healthy development of the industry.

B. OTHER RUBBER MANUFACTURES

Apart from pneumatic tyres and tubes, a variety of other useful products are also manufactured by the rubber manufactures industry. Both the range of product and installed capacity of the industry have substantially increased in recent years. The manufacture of a number of new items like V-belts, rubber conveyor belts, hydraulic brake hoses, spray hoses, foam cushions, tennis balls, etc., have also been taken up within the country.

Installed capacity and production.—The present position in regard to some of the major items of rubber manufactures is summarised in the statement at Annexure I. This statement indicates the annual capacity and production in recent years for a number of important rubber products. It will be observed that there is already adequate capacity for the production of most of these items. It is also not difficult to create additional capacity for these goods whenever required.

Among the various items indicated in the statement at Annexure I, the manufacture of rubber footwear is probably the most important single item providing the largest employment and accounting for a substantial consumption of rubber. The present capacity for the manufacture of footwear is 41·1 million pairs per annum. The industry is, by and large, concentrated in Calcutta. 14 units out of the total number of 19 factories in existence are located in this area. Excluding the factories of the Bata Shoe Company which account for the bulk of capacity and production, the remaining are small units. Production of rubber footwear has steadily gone up in recent years from about 22·8 million pairs in 1952 to 34·9 million pairs in 1955. Rubber footwear is exported in substantial quantities. Imports are negligible. Exports of all varieties of rubber footwear in the last four years are as follows :—

	1952-53	1953-54	1954-55	1955-56 (Ten months, April to January)
All rubber (pairs)	302,387	405,307	172,674	280,934
Rubber soled with canvas uppers (pairs) .	1,177,939	2,645,933	1,937,589	1,373,314
Rubber soled with leather uppers (,,) .	..	69,749	173,424	43,730

Schemes licensed and under implementation.—A number of schemes including a few for the manufacture of new items of rubber goods have been licensed. A list of these schemes is given in Annexure II. With the implementation of the two schemes for the manufacture of tennis balls it is envisaged that a part of the internal demand would be met. Black tape, rubber tape and vinyl tape; surgical gloves and microporous rubber separators are some of the new items which are proposed to be manufactured for the first time in the country.

In regard to rubber footwear, capacity for an additional production of 3 million pairs of canvas shoes has been licensed. Further expansion of capacity for rubber footwear has to be correlated with the growth of demand and the programmes for the manufacture of leather footwear in the organised and decentralised sectors.

Miscellaneous.—Some items whose manufacture has not been taken up so far and which are being imported are indicated below :—

1. Aircraft re-fuelling hoses, floating type tanker discharge hoses,
2. Fire fighting hoses exceeding a pressure of 200 lbs. per square inch.
3. Battery separators.
4. Life jackets.
5. Rubber prophylactics.

The manufacture of these items has to be encouraged. There is also scope for undertaking the manufacture and expansion of a number of rubber components for railways, automobiles and aircraft.

The programme of development for the rubber goods industry envisaged for the Second Plan period is summarised below:—

	1955-56	1960-61
Annual capacity (Million numbers) :		
1. Automobile tyres	·95	1·46
2. Automobile tubes	·95	1·46
3. Bicycle tyres	6·00	11·80
4. Bicycle tubes	8·10	11·80
Production (Million numbers) :		
1. Automobile tyres	0·91	1·46
2. Automobile tubes	0·81	1·46
3. Bicycle tyres	5·75	11·80
4. Bicycle tubes	5·59	11·80
Exports (Thousand numbers) :		
1. Automobile tyres	60	150
2. Automobile tubes	60	150
3. Bicycle tyres	70	300
4. Bicycle tubes	90	300

ANNEXURE I

Items		Capacity* per annum	Number of units	Production			
				1952	1953	1954	1955
1. Ebonite rods and sheets.	(lbs.)	1,157,400	14	125,923	88,235	108,993	130,264
2. Water-proof fabrics	(Yards)	5,982,000	12	1,295,249	2,061,624	2,309,689	2,119,035
3. Latex foam sponge	(lbs.)	1,126,000	7	639,237	495,982	935,443	1,469,306
4. Rubber footwear	(Pairs)	41,131,200	19	22,799,678	23,993,567	29,854,400	34,891,045

ANNEXURE I—*contd.*

Items		Capacity* per annum	Number of units	Production			
				1952	1953	1954	1955
5. Dipped rubber goods	(Dozen)	46,979,700	16	13,842,267	12,443,502	17,403,794	22,926,680
6. Radiator hoses	(Numbers)	474,300	9	154,932	139,821	151,192	186,589
7. Vacuum brake hoses	(,,)	930,000	4	443,664	472,186	604,871	808,064
8. Other types of hoses	(Feet)	9,918,000	14	3,553,772	4,402,179	4,706,016	5,734,812
9. Fan belts	(Numbers)	882,300	5	557,567	432,531	459,102	655,263
10. Rubber components of railway fittings (springs).	(,,)	1,290,000	4	1,216,466	1,233,182	1,290,850	1,540,045
11. Industrial V-belts	(,,)	174,300	4	7,650	46,188	60,000	146,095
12. Off-the road tyres	(,,)	6,000	2	481	746	838	1,814
13. Cab-tyres	(Feet)	1,465,500	3	385,751	442,403	325,550	377,171

*Capacity is estimated on the basis of one shift operation.

ANNEXURE II

Schemes licensed and under implementation

Name of the unit	Name of the product	Capacity	
1. India Rubber Manufacturers, Calcutta.	(i) Tennis balls . . . . . (ii) Sports goods, rubber . . .	2,000 5,000	dozen per month. ,, ,, ,,
2. International Rubber Mills, Meerut.	Tennis balls	50,000	dozen per annum.
3. Standard Batteries, Bombay.	Microporous rubber separators . .	7·5	million pieces per annum.
4. Nanco Rubber and Plastics Co., Coimbatore.	(i) Black tape (ii) Rubber tape (iii) Vinyl tape } . . .	300,000	lbs. per annum.
5. R. F. Harvey, Madras.	(i) Spindle tape . . . . . (ii) Woven belting . . . . . (iii) V-belts and fan belts . . .	9,600 365,000 12,000	gross yard per annum. ft. per annum. per month.
6. British India Corporation, Kanpur.	Rubber soles and heels	20,000	pieces per month.

ANNEXURE II—*contd.*

Name of the unit	Name of the product	Capacity	
7. Coruna Sahu Co., Bombay	(i) Canvas shoes	250,000	pairs per month.
	(ii) Heels	48,000	-do-
	(iii) Soles	24,000	-do-
	(iv) Cycle pedals	2,688	sets of 4 per month.
	(v) Handle grips	2,688	-do-
	(vi) Radiator hoses	1,440	numbers per month.
	(vii) Rubber rings	576	-do-
	(viii) Cycle brake rubber	2,400	-do-
	(ix) Rubber balls colour	600	gross per month.
	(x) Sponge toys fabric	12·5	tons per month.
	(xi) Rubberised fabrics	12,000	yards per month.
8. Associated Industries, Bhavnagar.	1. Rubber cots	1·5	lakhs per month.
	2. Rubber aprons	10,000	per month.
9. Associated Rubber and Plastic Works, Calcutta.	1. Fan belts	2,000	numbers per month
	2. Transmission belting	2,000	yards per month.

34. PAPER AND PAPER-BOARD

I. Review of Progress in the First Plan

Targets.—The position of the paper and paper-board industry at the beginning of the First Plan and the targets of capacity and production envisaged are summarised in the following table :—

	1950-51			1955-56		
	Number of units	Annual rated capacity (Thousand tons)	Actual production (Thousand tons)	Number of units	Annual rated capacity (Thousand tons)	Actual production (Thousand tons)
Paper and paper-board . . .	17	136·6	114	19	211	200
Newsprint	..	..	..	1	30	27
Strawboards and other boards . . .	18	48·5	22	20*	58·5	52·6

*Including two strawboard mills taken on the active list of the Development Wing in 1952.

The demand for paper and paper-board was estimated to reach a figure of 200,000 tons by the end of the Plan period and it was envisaged that almost the entire requirements, except for certain special types of paper would be met from within the country.

As regards newsprint, although the demand for it was estimated at 100,000 tons by 1955-56 a capacity of 30,000 tons only was expected to be created by the completion of the Nepa Mills in Madhya Pradesh. However, in view of the large gap between the estimated requirements and the anticipated production of the Nepa Mills, the Planning Commission recommended that suitable steps should be taken during the Plan period for the establishment of a newsprint-*cum*-chemical pulp plant with a capacity of 100 tons per day.

The demand for strawboards was estimated to increase to 70,000 tons by 1955-56, and it was considered that there might be a gap of about 17,000 tons between this and the domestic production. It was hoped, however, that the gap might be narrowed by diverting bagasse from sugar factories, where it is used as a fuel, for use by factories making strawboards. Only a moderate increase of about 10,000 tons in capacity for strawboard was envisaged.

As against the targets indicated above, the capacity, production and consumption levels estimated to have been reached by the end of the Plan period in different sectors of the industry are set forth in the following paragraphs.

Capacity, production and consumption.—(*i*) *Paper and paper-board.*—At the commencement of the First Plan there were 17 paper factories with an annual rated capacity of about 136,600 tons. Since then, three new plants have gone into production and fourteen of the existing factories have been modernised or expanded leading to an increase in capacity by 73,500 tons. Details of these schemes are given below.

Schemes completed in 1951—56

Name of the units	Nature of scheme	Annual capacity (1950-51) (Tons)	Present annual capacity (Tons)	Date of commencement of production or completion of expansion
Cauvery Valley Paper Mills, Mysore	New unit	..	3,000	1952
Ballarpur Paper Mills, Madhya Pradesh	,,	..	8,000	1952
Paper Pulp Conversions, Poona	,,	..	4,600	1954-55
Bengal Paper Mills, Calcutta	Modernisation	11,000	14,000	1952
Punalur Paper Mills, Travancore-Cochin	Expansion	4,000	6,000	1953
Sirpur Paper Mills, Kaghaznagar	Expansion and new unit.	5,000	15,000	1954-55
Rohtas Industries, Dalmianagar	Expansion	11,000	29,000	1955-56
Shree Gopal Paper Mills, Jagadhari	,,	8,500	15,000	1954-55
Mysore Paper Mills, Bhadravati	,,	4,000	8,000	1954
Star Paper Mills, Saharanpur	,,	4,500	6,500	1954
Titaghur Paper Mills, Calcutta	Modernisation	38,000	42,000	1955-56
Orient Paper Mills, Sambalpur, Orissa	,,	31,500	36,000	1955-56
India Paper Pulp Co., Calcutta	,,	6,000	6,600	1955-56
Upper India Couper Paper Mills, U.P.	,,	1,900	3,000	1955-56
Gujarat Paper Mills, Ahmedabad	,,	1,500	2,500	1955-56
Deccan Paper Mills, Poona	,,	2,500	3,600	1955-56
Pudumjee Paper Mills, Bombay	,,	1,100	1,200	1955-56

With the implementation of the above schemes, the annual rated capacity of the paper and paper-board industry stood in April 1956 at about 210,000 tons. (This capacity is exclusive of the capacity of the Travancore Rayons for transparent paper which is estimated to be 1,800 tons per annum.)

The State-wise distribution of the industry as on April 1, 1956 is as follows :—

States	Number of units	Annual rated capacity (on the basis of 300 working days) (Tons)
West Bengal	4	66,100
Bihar	1	29,000
Orissa	1	36,000
Uttar Pradesh	2	9,500
Punjab and PEPSU	1	15,000
Bombay	4	11,900
Madras	1	600
Madhya Pradesh	1	8,000
Andhra	1	2,000
Hyderabad	1	15,000
Mysore	2	11,000
Travancore-Cochin	1	6,000
TOTAL	20	210,100

The production of different varieties of paper and paper-board during the last six years has been as follows :—

Variety	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56 (Nine months, April to December)	1955-56 (Estimated)
Printing and writing. (Tons)	72,150	82,977	90,992	92,884	112,277	90,356	125,000
Wrapping (,,)	17,511	25,385	22,684	21,481	24,622	21,473	35,000
Special varieties (,,)	3,554	2,702	3,039	3,409	5,528	4,035	6,000
Paper-boards (,,)	20,821	24,027	20,122	19,527	26,663	23,910	34,000
TOTAL	114,036	135,091	136,837	137,301	169,090	139,774	200,000

It will be seen that although a significant rise took place in 1951-52, production remained more or less stationary during the next two years. Prolonged labour troubles in one of the major paper mills were partly responsible for the low production in 1953-54. In 1954-55, however, there was a marked increase and in 1955-56 production may have about reached the target of 200,000 tons visualised in the Plan.

Certain new varieties of paper and paper-board were manufactured for the first time in the country during the Plan period. These are, cigarette tissues, coated boards, art and cromo paper, sensitised cheque paper and cellulose film. The production of transparent paper by the Travancore Rayons also increased appreciably during the Plan period.

The aggregate demand for paper and paper-board, exclusive of newsprint and old newspapers, had been estimated at 175,000 tons during 1951-52 and 1952-53 and was expected to reach the figure of 200,000 tons by 1955-56. The actual consumption on the basis of domestic production plus imports (exports of paper have been insignificant) is shown in the following table.

Consumption of paper and paper-board during the First Plan ('000 tons)

Year	Production	Imports	Consumption	
			(Production plus imports)	As estimated in the Plan
1951-52	135.0	33.0	168.0	175.0
1952-53	137.0	39.0	176.0	175.0
1953-54	137.0	42.0	179.0	
1954-55	169.0	38.0	207.0	
1955-56 (Nine months, April to December)	140.0	37.0	177.0	
1955-56 (Estimated)	200.0	38.0	238.0	200.0

It will be seen that the demand for paper and paper-board has developed at a rather faster rate than was visualised in the Plan. On the other hand, the demand for strawboards has hardly risen at all (*vide infra*).

(ii) *Newsprint.*—Newsprint was not manufactured in the country at the beginning of the First Plan, but the construction of the State-aided Nepa Paper Mills had commenced by then and it was expected that they would go into production during 1953. The programme, however, fell much behind schedule due to financial and other difficulties. Certain sections of the factory were completed by the end of 1954 and experimental production commenced from January 1955, making use of mechanical pulp from the factory and imported chemical pulp. The chemical pulp section has been brought into production in early 1956. When in full production, the Nepa Mills will produce 30,000 tons of newsprint based on the utilisation of chemical pulp from bamboo and mechanical pulp from *salai* wood. Thus, while the capacity target envisaged in the Plan has been achieved, the production target of 27,000 tons has not been reached; in fact the production of newsprint in 1955-56 is estimated to have been only about 4,200 tons.

The consumption of newsprint has not reached the expected level of 100,000 tons by 1955-56 as is shown by the following figures:—

	(Thousand tons)
1951-52	50.0
1952-53	54.0
1953-54	70.0
1954-55	79.0
1955-56 (Estimated)	75.0

(*iii*) *Strawboards and other boards.*—At the commencement of the First Plan (April 1951), there were 18 factories on the active list of the Development Wing of the Ministry of Commerce and Industry (DWCI) engaged in the production of boards with a total capacity of 48,500 tons per annum, but in 1952 two more factories were taken on the active list of the DWCI raising the figure of annual capacity to 54,500 tons. At present, there are 24 units on the list with an annual installed capacity of 59,380 tons. Five of these are fairly big, with a capacity of more than 5,000 tons each, and can be considered economic. The rest are small units and work by fits and starts depending on spurts in demand. It was visualised under the First Plan, that the annual installed capacity of the strawboard industry would increase to 58,500 tons by 1955-56.

Demand for strawboards has not expanded to 70,000 tons as expected—in fact it has not shown any very marked increase over the 1950-51 level and consequently, there has been only a slight increase in production during the last five years, and a large percentage of the capacity continues to be unutilised. Figures of production for the last five years, are as under:—

Year	Number of units reporting	Production (Tons)
1951	16	26,943
1952	20	26,283
1953	23	28,674
1954	23	31,382
1955	23	32,000 (Estimated).

The general shift to paper-board and other superior types of packing material is the main reason why the demand for strawboards has remained comparatively stagnant.

Capital and labour.—The implementation of the programme of development envisaged in the period of the First Plan was estimated to cost about Rs. 8 crores. The latest estimate places the gross fixed investment in the paper and paper-board industry during the plan period including depreciation and replacement investment, at about Rs. 11 crores. This, it may be pointed out, includes investments on schemes which are in varying stages of implementation (*vide infra*) but expected to be completed only during the Second Plan period.

The industry is estimated to employ about 28,000 persons.

Action on main recommendations.—(*i*) It was recommended in the First Plan, that a plant capable of producing both newsprint and chemical pulp for the rayon and staple fibre industry, should be established utilising soft wood from the Himalayan regions. Hardly any progress has, however, been made with this project mainly because of the difficulty of extracting timber from the remoter regions of the Himalayas at a sufficiently cheap cost. Efforts are being made to open up these areas and to devise new and cheaper methods of extraction and it may be found possible to utilise some of these resources during the Second Plan period.

The Plan also recommended that research and pilot plant investigations should be undertaken on the possibilities of utilising bagasse to produce pulp suitable for newsprint manufacture. The Ministry of Commerce and Industry have invited two teams of experts from Germany and Italy to prepare project reports on the utilisation of bagasse and other raw materials in the manufacture of pulp, paper and newsprint. These teams have started on a survey of the country.

(*ii*) It was recommended that the paper industry should adjust its production programme so as to meet the requirements of the match, cigarette, packing and coated abrasive industries. The industry has made satisfactory progress in correlating its production with the needs of industrial consumers and in meeting their demand for special varieties of paper. Except for kraft paper of the standard required by the abrasive industry, which is not yet manufactured indigenously, almost all other varieties of paper are being produced in sufficient quantities. In fact in regard to cigarette paper it has been possible to develop an export market.

Problems of the Industry.—Difficulties in regard to the supply of bamboo, *sabai* grass and other cellulosic materials which constitute the main raw materials in the manufacture of paper and paper-board have been a source of considerable anxiety to the industry. Inadequate information about the availability of raw materials in different regions, inadequate transport facilities and the restrictive policies adopted by some of the State Governments have been the main causes of these difficulties. With a view to finding ways of augmenting the supply of raw materials to the industry and to facilitate the adoption of uniform policies in the leasing of forests, the Food and Agriculture Ministry convened a meeting of the State Forest Ministers in October 1955. It was decided at this meeting that (i) each State should conduct a survey of its resources of raw material for the paper industry and (ii) an *ad hoc* Committee should be set up to consider the problems regarding the supply of raw materials for the industry. This Committee has since been set up. A suggestion has also been made that in due course a Forestry Commission should be appointed which in addition to its other functions would also serve as an advisory planning body for the paper industry, keeping in view the available resources of raw materials.

II. Programme of Development in the Second Plan

Estimated requirements: (*i*) *Paper and paper-board.*—(i) The growth of demand for paper is closely related to the programme of development envisaged in the field of education and the rise in the general standard of living and literacy expected as a result of the implementation of the Second Plan. The growth of industrial production also has a considerable influence on the requirements of both paper and paper-board. During the past five years the consumption of paper and paper-board increased on an average by about 8 per cent per annum. Having regard to the more rapid rate of increase envisaged over the next five years in industrial production, literacy and the general standard of living, the demand for paper and paper-board may be expected to show a progressive annual increase of 10 per cent during the Second Plan period. On this basis, the demand by 1960-61 may be estimated at about 350,000 tons.

(*ii*) *Newsprint.*—In estimating the probable demand for newsprint during the Second Plan period account has again to be taken of the additional demand arising from higher standard of living and increased literacy which are bound to be reflected in an expansion of the newspaper-reading population. The growing political awareness of the masses and the probability of more newsprint becoming available from indigenous production, are also factors to be reckoned with. Mr. Sundelin, an F. A. O. expert, estimated in 1955 that the demand for newsprint would go up to 132,000 tons by 1962. This would mean an increase of about 9 per cent per annum over the present level of consumption. This estimate may be somewhat on the high side and perhaps, an estimate of 120,000 tons by 1960-61 will prove nearer the mark.

(*iii*) *Strawboards and other boards.*— The demand for strawboards and other boards is rather limited due to the introduction of box boards and other types of packing material. The production of the industry is almost stagnant at about 30,000 tons and conditions do not appear to be favourable for any appreciable development in the near future. The estimated annual consumption of strawboards and other boards may, therefore, be placed at 35,000-40,000 tons by 1960-61.

Schemes licensed and under implementation : (i) Paper and paper-board.—A number of projects which will increase the capacity of the industry have been licensed during the First Plan under the Industries (Development and Regulation) Act. Details of these are given below :—

Firm	Nature of the scheme	Item	Existing capacity (Tons)	Capacity after scheme has been completed (Tons)
1. Dorab Paper Mills, Poona	New unit	Paper	..	3,300
2. Tapti Valley Paper Mills, Bombay	do.	Kraft pulp paper and boards.	..	3,000
3. Shri Gopal Paper Mills, Jagadhri	Expansion	Paper and paper-board.	15,000	23,100
4. Bharat Paper Mills, Assam	New unit	Paper	..	15,000
5. Rohtas Industries, Dalmianagar	Expansion	Boards M. G paper.	29,000	51,960
6 West Coast Paper Mills, Bombay	New unit	White printing, writing, wrapping, and paper-boards.	..	18,000
7. Titaghur Paper Mills, Orissa	do.	Printing and writing paper.	..	8,000
8. Orient Paper Mills, Orissa	Expansion	Plastic resin coated M.G. & M. F. paper.	36,000	50,000
9. Star Paper Mills, Saharanpur	do.	Writing and printing and M. G. paper.	6,500	21,000
10. India Paper Pulp Co., Calcutta	do.	Writing and printing paper.	6,600	15,000
11. Sirpur Paper Mills, Kaghaznagar	do.	Paper and boards, all sorts M.G., M. F. and cheap wrapping and printing, newsprint, etc.	15,000	36,000
12. Straw Products, Orissa	New unit	Bookpaper, high-grade writing & printing paper etc.	..	18,000
13. Straw Products, Bhopal	Expansion	Paper-board	..	5,400

In addition to the above, the following projects are expected to be taken up in the public sector:—

	New/additional capacity
1. Expansion of the Andhra Paper Mills	6,000 tons
2. Security Paper Mill	1,500 tons

The expansion of the Andhra Paper Mills is expected to bring this factory to a more economic size and thus bring down the cost of production. The Security Paper Mill is proposed to be established by the Central Government under the Ministry of Finance to meet the requirements of bank note and other security paper which is at present entirely imported.

When all the above schemes are implemented, the annual rated capacity of the paper and paper-board industry will increase from 210,000 tons to about 377,000 tons.

Since March 1956, one new unit and three expansions with a total annual capacity of 45,400 tons have been recommended for licences. This will raise the total capacity of the industry to about 422,000 tons per annum.

(*ii*) *Newsprint.*

(*iii*) *Strawboards and other boards.*

There are at present no schemes under implementation in these two sectors of the industry.

Targets of capacity and production.—(*i*) *Paper and paper-board.*—Since the demand for paper and paper-board is likely to be of the order of 350,000 tons by 1960-61, it is desirable to achieve self-sufficiency and production of this order within the country by 1960-61 is envisaged. There is, however, normally a gap between capacity and production and to provide for this and for the possibility of demand expanding more rapidly than estimated, it is desirable to plan for a capacity somewhat higher than the estimated requirements. Taking the average production at 80 per cent. of capacity, it would be necessary to bring up the installed capacity to about 450,000 tons to achieve a production of 350,000 tons by 1960-61.

The installed capacity of the inudstry is expected to increase to about 422,000 tons, when all the schemes already licensed have been completed, and so a further increase of about 28,000 tons will be necessary to achieve the target capacity of 450,000 tons by 1960-61.

(*ii*) *Newsprint.*—With the demand for newsprint estimated to go up to 120,000 tons by 1960-61, it will hardly be possible to achieve complete self-sufficiency in regard to the commodity during the next five years. Investigations are already in progress with a view to finding sufficient supplies of timber or other raw materials of the right quality and at the right price to start one or more newsprint factories; and it is expected that during the period of the Second Plan, the National Industrial Development Corporation will, in the light of these investigations, take steps towards this end, possibly, in collaboration with private enterprise. The availability of sufficient supplies of bagasse and the economics of its substitution by other fuels in sugar factories, the extent to which conifers in the Himalayan region or eucalyptus and wattle trees in the Nilgiri areas could be utilised for the manufacture of newsprint, are factors likely to determine the number of newsprint factories that can be established during the next five years and their location. It is, however, expected that at least one new factory of approximately the capacity of the Nepa Mills will come into production during the Plan period and that preliminary steps will have been taken before

1960 towards the establishment of a second factory. Even so by the end of the Second Plan period, the capacity for the production of newsprint would not be more than 60,000 tons and imports would, therefore, have to continue at about 60,000 tons per annum during the period of the Second Plan. Since the targets envisaged would be considerably short of requirements, further expansion of newsprint production should be encouraged if conditions prove favourable therefor.

(*iii*) *Strawboards and other boards.*—The present capacity of the industry, 59,380 tons, is more than adequate to meet the estimated demand of 35,000-40,000 tons by 1960-61. Further expansion of the industry does not seem, therefore, to be necessary.

Investment and employment.—It is estimated that a sum of about Rs. 44 crores over and above the investment of about Rs. 4·25 crores in public sector projects will have to be invested in the paper and paper-board industry during the Second Plan period, to achieve the capacity target of 450,000 tons. The investment on newsprint factories is placed at Rs. 6 crores. Thus an additional investment of about Rs. 54 crores should enable the industry to achieve a capacity of 450,000 tons of paper and paper-board and 60,000 tons of newsprint by 1960-61. This figure is considerably higher than the Rs. 11 crores estimated to have been invested during the First Plan. While it is expected that the bulk of the resources will be found from the private sector, these resources may have to be suitably supplemented by assistance from the Industrial Credit and Investment Corporation and the Industrial Finance Corporation.

The expansion of the industry is estimated to provide employment for about 15,000 additional persons.

Requirements of raw materials and power.—Apart from cellulosic materials like bamboo, *sabai* grass, wood pulp, bagasse, rags, waste paper etc., which are the main raw materials of the industry, caustic soda, chlorine, and various other chemicals are also consumed by it. It is estimated that the industry will require about 27,000 tons of caustic soda by 1960-61. While no special difficulties have been experienced or are anticipated in regard to these chemicals, the supply of bamboo and *sabai* grass has been, as already mentioned, a matter of some concern. Bamboo is the most important of the cellulosic material utilised for paper making in the country, and its consumption in 1954 is estimated at 300,000 tons as against 65,000 tons of *sabai* grass and 25,000 tons of soft wood. To achieve an output of 350,000 tons of paper and paper-board in 1960-61, the level of production attained in 1954-55 will have to be rather more than doubled. The strain on the available raw materials will be considerable and unless steps are taken to augment the supply *pari passu* with the increase in production, the achievement of the target may not be possible. Apart from increasing the supplies of the conventional raw materials now mainly in use, the possibility of utilising alternate materials like bagasse and other agricultural residues will have to be explored. A suitable programme of development will have to be worked out early on the basis of the recommendations that will be made by the *ad hoc* Committee set up by the Ministry of Food and Agriculture for taking up plantation of fast growing species of timber like eucalyptus, wattle, paper mulberry etc., and a rational plantation of reeds like *eta* and *arundonex*.

The power requirements of the industry are mostly met from power plants attached to the factories themselves. It is, however, estimated that about 30,000 to 40,000 K W will be drawn by the industry from public electricity undertakings during the Second Plan.

Miscellaneous : (i) Economic unit.—It is considered that a unit of 50 tons capacity per day should normally be viewed as the minimum economic size for a paper mill, coupled with a pulp plant for the manufacture of ordinary categories of writing, printing and wrapping paper. In the case of special varieties of paper, however, even a unit of smaller size can be considered to be economic.

(*ii*) *Production of cheap varieties of paper.*—There is a distinct demand in the country for cheap varieties of printing paper which are extensively used in the printing of religious literature, children's books, school and college texts, almanacs, etc. The ordinary printing paper produced in the country is too costly, and has become even more so with the recent imposition of an excise duty, and so a sizeable quantity of imported newspaper was being used until recently for these purposes. But on the representations of the Indian paper industry that their interests would be jeopardised if free import of newsprint continued, newsprint has been taken off the Open General Licence and imports are at present permitted only to the extent of requirements for newspapers. This, however, means that newsprint is not freely available as hitherto, as a substitute for cheap varieties of paper. With regard to wrapping papers also, there is considerable demand for the cheaper varieties. At present, old newspaper is being imported into the country in increasing quantities as a cheap wrapping paper. The wrapping paper produced indigenously and the imported variety are both considerably higher in price than the imported old newspaper, and this price difference has been the main cause of the increasing use of old newspapers for wrapping purposes. In view of the above, it is considered that special efforts should be made to foster the development of the two varieties of cheap paper, *viz.*, cheap printing paper, and cheap wrapping paper.

(*iii*) *Common production programme.*—The development of the handmade paper industry on a cottage scale is one of the items included in the programme of the All-India Khadi and Village Industries Board under the Second Plan. Among the varieties of handmade paper produced at present are high grade paper, common utility paper and blotting paper. According to the programme drawn up by the Board, about 4,000 tons of paper will be manufactured by the different centres by 1960-61 and this will result in the employment of 12,000 persons. The Board has suggested the reservation of blotting, bond, drawing and filter papers exclusively for the cottage sector in the Second Plan. This suggestion is under consideration.

The following table summarises the development of the paper and paper-board industry envisaged during the period of the Second Plan:—

	1955-56		1960-61	
	Annual rated capacity (Thousand tons)	Production (Thousand tons) (Estimated)	Annual rated capacity (Thousand tions)	Production (Thousand tons)
Paper and paper-board	210.0	200.0	450.0	350.0
Newsprint	30.0	4.20	60.0	60.0
Strawboard and other boards (excluding fibre-board)	59.3	32.0	59.3	35.0 to 40.0

35. CEMENT

I. Review of Progress in the First Plan

Targets.—In the First Plan it was envisaged that by the expansion of 11 of the units in existence and the establishment of 6 new plants, the installed capacity of the cement industry would increase to 5·31 million tons from 3·28 million tons in 1950-51. Actual production was expected to rise to 4·8 million tons per annum by 1955-56.

Capacity and production.—As against the targets mentioned above, the industry achieved an installed capacity of 4·931 million tons by the end of the First Plan and an actual production of 4·6 million tons in 1955-56. The total number of units in existence has risen, as expected, from 21 in 1950-51 to 27 at the present time. Among the new units completed special mention may be made of the Uttar Pradesh Government's factory at Churk which went into production in 1954, and that of the Associated Cement Companies' (ACC) at Sindri, designed for operation on the calcium carbonate sludge of the fertilizer factory, which went into production in September 1955. The regional distribution of the installed capacity at the commencement of the Second Plan is shown in the following table:—

	1950-51		1955-56	
	Number of units	Rated capacity ('000 tons)	Number of units	Annual installed capacity ('000 tons)
Bihar	5	922	6	1,122
Orissa	..	..	1	165
Uttar Pradesh	..	..	1	200
Madhya Pradesh	1	350	1	350
Madhya Bharat	1	60	1	60
Rajasthan	1	225	2	525
PEPSU	2	242	2	370
Saurashtra	3	337	3	492
Bombay	..	..	2	300
Madras	5	770	3	642
Andhra			2	189
Mysore	1	86	1	86
Travancore-Cochin	1	50	1	50
Hyderabad	1	240	1	380
TOTAL	21	3,282	27	4,931

During the past five years there has been a general rise in the size of the plants as is evident from the figures below:—

	1950-51		1955-56	
	Number	Total capacity (Tons)	Number	Total capacity (Tons)
Less than 1 lakh tons	8	492,000	8	539,000
100,000—200,000 tons	6	895,000	9	1,445,000
200,000—300,000 tons	5	1,215,000	6	1,527,000
Above 300,000 tons	2	680,000	4	1,420,000
TOTAL	21	3,282,000	27	4,931,000

The progress in the expansion of capacity and production in the different years of the Plan is shown below:—

	Installed capacity (Million tons)	Actual production (Million tons)
1950-51	3·280	2·692
1951-52	3·706	3·281
1952-53	3·796	3·510
1953-54	4·243	4·028
1954-55	4·444	4·418
1955-56	4·931	4·600

The share of the ACC in the total expansion that has taken place is just under 50 per cent.

Other ancillary developments.—The ACC established a washing plant at Khalari for beneficiating lower grades of limestone found associated with richer varieties to ensure supplies of limestone of uniform grade. Further they initiated developments in connection with bulk deliveries of cement cutting down the use of jute bags.

Imports and exports.—After 1950, imports of cement, which normally include white, coloured and other types of cement also, were restricted to quantities included in trade agreements and those in respect of which commitments had been entered into prior to 1950. The imports of cement by land and sea during the period of the Plan were as follows:—

Year	(Tons)
1951-52	10,312
1952-53	3,652
1953-54	6,694
1954-55	7,707
1955-56 (Ten months, April to January)	14,549

The Plan envisaged the export of 200,000 to 300,000 tons of cement per annum by 1955-56, but as a result of the increased internal demand this target could not be achieved. Exports by land and sea during the Plan period have been as follows:—

Year	(Tons)
1951-52	67,758
1952-53	57,441
1953-54	86,116
1954-55	100,957
1955-56 (Ten months, April to January)	51,760

Consumption.—The actual consumption of cement in 1949-50 and 1950-51 was at the rate of 2·6 million tons per annum. It was expected that during the First Plan, the demand for cement, exclusive of the quantity required for multi-purpose projects and roads, would expand from 2·6 million tons in 1950-51 to about 3·3 million tons by 1952-53 and to 3·8 million tons by 1955-56. Taking into consideration the annual average requirements of cement for multi-purpose projects (600,000 tons) and for development of roads (over 100,000 tons), the total demand in 1955-56 was estimated at about 4·5 million tons.

The Tariff Commission in their Report on the "Revision of Prices of the Cement Industry" (1953) estimated the total demand for cement in 1952-53 at 3·65 million tons and having regard to the several big projects under execution by the Central and State Governments, expected the demand to increase at the rate of 10 per cent per annum during the next three years. On this basis the estimated demand in 1955-56 should be of the order of 4·86 million tons.

A recent estimate by the Ministry of Commerce and Industry on the basis of the indents received from different consuming authorities for the first quarter of 1956 places the present demand for cement at 0·833 million tons per month (10·0 million tons per annum), the break-up of which is given below:—

	('000 tons per month)
Organised industries	105·35
Agriculture	50·63
Railways	42·15
Irrigation & power projects	41·93
Central Public Works Department	37·52
Defence	25·13
Rehabilitation	13·94
Educational purposes	7·88
States' demand	508·47
TOTAL	833·00

Demands made against the background of an anticipated shortage in supplies always tend to be exaggerated. On a balance of all factors entering into the assessment, it is estimated that with supplies of the order of 6·0 million to 6·5 million tons the demand in 1955-56 for cement could have been fully met. In other words the shortage of cement was of the order of 1·5 million to 2·0 million tons.

Capital and labour.—Excluding Rs. 2·92 crores spent on the 200,000 tons cement factory of the Uttar Pradesh Government at Churk about Rs. 15 crores are estimated to have been invested in new units and expansions in the cement industry during 1951-56. The loans actually advanced by the Industrial Finance Corporation of India to the cement industry up to April 30, 1955 are placed at Rs. 1·16 crores. The investment incurred by the Associated Cement Companies on their projects is estimated to amount to Rs. 11·76 crores during this period.

As against 33,000 persons employed at the commencement of the First Plan, the present strength of the labour force in the cement factories is estimated at about 40,000. It is estimated that about 75,000 persons will be employed in the industry by 1960-61.

Cement prices.—Till the end of May 1951 packing charges at Rs. 11-8-0 per ton were one of the elements included in the selling price of cement. With effect from June 1, 1951, the packing charges were separated from the selling price of cement in view of the rising cost of packing materials. In 1951 the price of cement supplied to the public was fixed at Rs. 71 per ton f.o.r.

destination plus actual cost of packing, subject to a maximum of Rs. 26 per ton. Due to a fall in the price of gunny bags in the early part of 1952, it was decided that packing charges should be revised every quarter on the basis of the average market prices of packing materials.

The question of the revision of the price of cement was examined by the Tariff Commission in 1953. The Government after due consideration of the report of the Tariff Commission fixed Rs. 67 per ton f. o. r. destination as the standard ceiling price of cement. In the case of the following five factories, whose costs of production are higher than others, the Government of India decided that the ceiling price of cement to be sold by them should be as follows:—

(1) Mysore Iron & Steel Works	Rs. 72	per ton
(2) Shri Digvijay Cement Co.	Rs. 75-8	,,
(3) India Cements	Rs. 75	,,
(4) Orissa Cement	Rs. 75	,,
(5) Travancore-Cochin Cement	Rs. 79	,,

The Government also allowed a further sum of Rs. 4 per ton to the standard units. The companies are required to hold the amount which this sum would yield after deduction of taxes, *viz.* Rs. 2 per ton in a separate fund for being used, with the consent of the Government, exclusively for rehabilitation and expansion purposes.

Separate higher prices were fixed for the cement produced by the Sawai Madhopur Factory (Rs. 74-8-0 per ton) and, on a provisional basis for the U. P. Government's Cement Factory at Churk (Rs. 78 per ton) which came into full production after receipt of the Tariff Commission's Report.

Problems of the Industry.—The principal problem of the cement industry is the incidence of freight charges on the cost structure. The majority of the plants are located at points separated by long distances from coal and high-grade limestone deposits. Many of the factories are also situated far away from the major centres of consumption. One of the ways by which the burden of high freight charges could be mitigated is to supply washed coal to cement factories. Similarly beneficiation of low grade limestone available within accessible distances could also reduce long haulages of this raw material. Another factor leading to high costs is the small size of some of the plants in operation. All these factors tending to inflate the cost structure should receive greater attention in future years.

II. Programme of Development in the Second Plan.

Estimated requirements.—The large-scale programme for roads, housing, industries and multi-purpose projects in the Second Plan will raise substantially the demand for cement which was envisaged in the first instance at 10·0 million tons by 1960-61. The region-wise break-up of this demand was visualised as under:—

	Demand in 1960-61* ('000 tons)
Delhi area	908
Kanpur area	1,221
Calcutta area	2,872
Bombay area	3,128
Madras-Coimbatore area	1,872
TOTAL	10,001

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* The estimated demand for 1960-61 in the various areas was recently calculated by the Ministry of Commerce and Industry.

Delhi area : comprises the States of Punjab, PEPSU, Delhi, Jammu & Kashmir and Himachal Pradesh.

Kanpur area : comprises the State of Uttar Pradesh.

Calcutta area : comprises the States of West Bengal, Bihar, Orissa, Assam, Tripura, Manipur and North East Frontier Agency.

Bombay area : comprises the States of Bombay, Saurashtra, Kutch, Ajmer, Rajasthan, Hyderabad, Madhya Bharat, Madhya Pradesh, Vindhya Pradesh and Bhopal.

Madras-Coimbatore area : comprises the States of Madras, Travancore-Cochin, Mysore, Coorg, Andamans and Andhra.

The above assessment of requirements was formulated without taking into account (a) the substantially higher levels of demand for cement envisaged by States like Uttar Pradesh under their Second Plan and (b) the increase in consumption of cement that might follow efforts at economising the consumption of steel owing to shortage of supplies of the latter through adoption of new techniques relating to prestressed concrete, vibrated concrete, shock concrete etc. While it is difficult to make very precise estimates, it can be reasonably presumed that, given adequate transport facilities, consumption of cement might go up to as much as 12.0 million to 12·5 million tons by 1960-61. Some of the factories situated in proximity to ports could also under favourable conditions export large quantities of cement. Taking all factors into consideration and the importance of cement as a developmental commodity, it is considered that a probable demand of 12·5 to 13·0 million tons by 1960-61 should be kept in view for purposes of planning the expansion of the industry.

Schemes licensed and under implementation.—According to the expansion programme of the industry so far approved by the Government the rated capacity will be increased from 4·931 million tons in 1955-56 to 12·3 million tons by 1960-61 as the result of the implementation of the following projects:—

I. Expansion of existing units—

	Capacity in 1955-56 ('000 tons)	Capacity in 1960-61 ('000 tons)
(a) Plants of the Associated Cement Companies at:		
Chaibasa (Bihar)	200	470 (1)
Dwaraka (Saurashtra)	220	335
Kistna (Andhra)	90	255
Kymore (Madhya Pradesh)	350	588 (2)
Lakheri (Rajasthan)	360	525
Porbandar (Saurashtra)	42	190 (3)
Shahabad (Hyderabad)	380	480
Surajpur (PEPSU)	300	400
Sindri (Bihar)	200	470 (4)
Madukarrai (Madras)	280	305

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(1) Out of this 170,000 tons is slag cement.
(2) Out of this 25,000 tons is white and coloured cement.
(3) Out of this 25,000 tons is white and coloured cement.
(4) Out of this 170,000 tons is slag cement.

	Capacity in 1955-56 ('000 tons)	Capacity in 1960-61 ('000 tons)
(b) Plants of the Dalmia Cement Co. at:		
Dalmia Dadri (PEPSU)	70	235
Dalmiapuram (Madras)	247·5	412·5
Sawai Madhopur (Rajasthan)	165	759
Rajgangpur (Orissa)	165	725 (5)
(c) Other cement factories:		
Vijayawada (Andhra)	99	165·6
Talaiyuthu (Madras)	115	215
Kalyanpur (Bihar)	42	144
Sika (Saurashtra)	230	430
Kottayam (Travancore-Cochin)	50	55
U. P. Government Cement Factory at Churk	200	431
Mysore Government Factory at Bhadravati attached to Mysore Iron and Steel Works	86	104 (6)

II. Establishment of new units—

	Capacity in 1960-61 ('000 tons)
(a) Plants of the Associated Cement Companies at:	
Mancherial (Hyderabad)	165
Siju Road (Assam)	165
Abu Road (Bombay)	165
Drug (Madhya Pradesh)	250 (7)
Yerraguntla (Andhra)	165
Veraval (Saurashtra)	165
(b) Plants of Ashok Cement Co. at:	
Dalmianagar (Bihar)	560 (8)
(c) Other cement factories:	
Ramakrishna Cements at Macherla	250 (9)
Panyam Cement & Mineral Industries at Betamcherla	62·7
Assam Cement Co. at Umtyngar	66·0
Birla Jute Manufacturing Co. at Satna	330
Hindustan Investment Corporation at Bilaspur	330
Shri S. K. G. Somani at Satna	220
Shri R. C. Nagri at Bhavnagar	150
Baroda Cement Co. at Pratapnagar	100
Shri Nanji Kalidas Mehta at Porbandar	200
Hindustan Sugar Mill at Dehra Dun	200
V. Rama Krishna & Sons at Thiruvottiyur	16·5 (10)

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(5) Out of this 360,000 tons is slag cement.

(6) Slag cement is of the order of 18,000 tons.

(7) Out of this 85,000 tons is slag cement.

(8) This unit is expected to go into production during 1956 with an initial capacity of 280,000 tons and later on it will be expanded to 560,000 tons.

(9) This unit is expected to go into production during 1956 with an initial capacity of 100,000 tons and later on it will be expanded to 250,000 tons.

(10) White and coloured cement.

Targets of capacity and production.—It is envisaged that the capacity of the cement industry should be stepped up to 16·0 million tons per annum by the end of the Second Plan. Keeping in view the requirements discussed earlier, a production target of 13·0 million tons is visualised in 1960-61.

Additional capacity required.—For filling the gap between the capacity approved for implementation so far and visualised under the target, it has not been found possible to license further schemes due to the fact that on the basis of planning so far made by the Ministry of Railways, rail transport capacity is not expected to be available for any additional production of cement. In fact the Plan as it has now emerged provides transport facilities for 9·0 million tons of cement by rail by 1960-61. The question of securing additional transport capacity and the licensing of additional schemes in such a way that only minimum additional strain is placed on the Railways is under consideration.

On the basis of schemes approved so far, the State-wise distribution of the cement industry in 1960-61 is expected to be as under:—

	Number of units	Rated capacity ('000 tons)
Bihar	7	2,324
Orissa	1	725
Uttar Pradesh	2	631
Madhya Pradesh	3	1,168
Madhya Bharat	1	60
Rajasthan	2	1,284
PEPSU	2	635
Saurashtra	5	1,470
Bombay	4	565
Madras	4	949
Mysore	1	104
Travancore-Cochin	1	55
Hyderabad	2	645
Andhra	5	898
Assam	2	231
Vindhya Pradesh	2	550
TOTAL	44	12,294

Investment.—For the expansion of capacity in the private sector to 15·5 million tons by 1960-61 from 4·6 million tons in March 1956—the capacity in the public sector in the corresponding periods will be 5 lakh tons and 3 lakh tons respectively—an investment of about Rs. 80 crores is likely to be required. The development programme of the ACC envisages an investment of Rs. 35 crores for stepping up the capacity of their factories from 2·782 million tons in March 1956 to 5·288 million tons by the end of the Second Plan. For the implementation of this programme the Company has taken steps in 1955-56 to raise Rs. 6·46 crores by a new issue of capital. The ACC have further entered into a cash-credit arrangement with the State Bank of India enabling the company to borrow up to a limit of Rs. 4 crores against the security of its own 5 per cent first mortgage debentures deposited with the Bank. This additional finance supplemented by the Company's own present and prospective internal resources, will be adequate for the purpose of implementing all the development schemes of the Company approved by the Government.

Production during the Second Plan.—The following pattern of production is envisaged during the period of the Second Plan.

	(Million tons)
1956-57	7·42
1957-58	8·92
1958-59	9·48
1959-60	11·0
1960-61	13·0

Requirements of raw materials.—While limestone will be the main raw material for cement manufacture, the following quantities of calcium carbonate sludge and blast furnace slag are expected to be consumed:—

	(Million tons)
Calcium carbonate sludge	0·413*
Blast furnace slag	0·402†
Limestone	18·75
Gypsum	0·62
Coal	5·85

The following table summarises the development programme of the industry:—

	Unit	1955-56	1960-61
Annual rated capacity	('000 tons)	4,931	16,000
Production	,,	4,600‡	13,000

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* The capacity of the Sindri Fertilizer Factory for the production of calcium carbonate sludge will be of the order of 0·413 million tons after its expansion. A C C's cement factory at Sindri will be expanded to a capacity of 300,000 tons which will enable consumption of the entire sludge produced.

† In the slag cement, the slag content will be of the order of 50 per cent. On this basis, the requirements of the blast furnace slag have been calculated.

‡ Estimated production.

36. REFRACTORIES

Refractories are used essentially to withstand the thermal, chemical and physical effects that are met within furnace operations. They find wide application as lining materials for industrial furnaces. All industrial operations which involve the application of heat are, therefore, dependent on the availability of refractories. The tonnage of refractory materials produced is generally an index of the degree of industrialisation of a country.

A variety of refractory materials are in use, the commonest of all being firebricks. Other kinds of refractories that are generally met with in industrial furnace operations are chromite, magnesite and silica bricks. The choice of any particular refractory mainly depends on the temperature of the furnace and the chemical composition of the reactants involved in the operation. The range of refractory materials is progressively being widened with the addition of new types of refractories to suit specific conditions of operation. These special types are graphite refractories, silicon carbide products, high temperature cement, etc. They are not at present produced in India. Although they are required only in small quantities, they are of considerable importance to some industries.

Refractories are generally classified into three groups, *viz.*, acidic, basic and neutral, although in many cases a sharp distinction cannot be made. But for purposes of the requirements of the different consuming industries and the necessary development of the refractories industry, refractories may be broadly classified as follows:—

(i) Fireclay (alumino-silicate) refractories (firebricks) including moderate and high heat duty and high alumina refractories,

(ii) Basic and chromite refractories including magnesite, chrome-magnesite and magnesite-chrome refractories,

(iii) Silica refractories,

(iv) Insulation refractories,

(v) Refractory cement and mortar, and

(vi) Special refractories.

Broadly speaking the consumption of fireclay refractories exceeds that of all other types. The silica refractories are used mostly in building arches and crowns of furnaces on account of their unique load bearing capacity at high temperatures and thermal expansion. The common basic refractories are magnesite and combinations of chrome and magnesite refractories.

I. Brief Survey of the Industry.

Location, rated capacity and production.—The first factory to produce firebricks was established by the Burn and Co. at their Raniganj works in 1874. With the establishment of the iron and steel industry and the gradual industrial expansion in the country, the demand for refractories greatly increased and a large number of factories producing firebricks were set up. The manufacture of silica, chromite and magnesite bricks was also taken up.

There are at present (April 1956) 31 units engaged in the manufacture of refractories with a total installed capacity of 4,44,000 tons per annum. This estimate of capacity has been arrived at on the basis of a recent assessment of individual capacities of refractory units undertaken by the Development Wing of the Ministry of Commerce and Industry. The State-wise distribution of these units is indicated below:—

State	Number of units	Annual installed capacity (Tons)
1. Bihar	8	241,700
2. West Bengal	3	96,000
3. Bombay	4	4,960
4. Madras	3	8,940
5. Madhya Pradesh	5	37,600
6. Saurashtra	2	24,400
7. Mysore	3	8,600
8. Orissa	1	12,000
9. Delhi	2	9,800
TOTAL	31	444,000

The break-up of the total capacity according to the types of refractories produced is indicated in the following table:—

(i) Firebricks	320,000	tons
(ii) Silica refractories	30,000	,,
(iii) Basic refractories	10,000	,,
(iv) High alumina refractories	10,000	,,
(v) Insulating bricks	4,000	,,
(vi) Refractory cement mortar	70,000	,,
TOTAL	444,000	,,

Over 70 per cent of the total capacity is accounted for by the eleven units in the two States of Bengal and Bihar. These units primarily cater to the needs of the iron and steel industry, which is the major consumer of refractories accounting for nearly two-thirds of the total production. Since the two major steel factories, *viz.*, the Tata Iron and Steel Company, and the Indian Iron and Steel Company are located in this area and the raw materials for refractories are abundantly available there, the refractory industry has naturally developed there in close proximity to these units.

The industry has maintained a fairly high level of production, usually operating at about 60 to 70 per cent of the installed capacity. Almost the entire requirements of refractories, barring special refractories which are imported, are met from indigenous sources. Production, imports and consumption of refractories since 1951-52 has been as follows:—

	Unit	Production	Imports	Consumption
1951-52	Tons	239,300	1,020	240,320
1952-53	,,	240,100	4,873	244,973
1953-54	,,	225,900	5,970	231,870
1954-55	,,	239,500	9,420	248,920
1955-56 (Estimated)	,,	280,000	6,120	286,120

The break-up of production in 1955-56 by important types of refractories is estimated as follows:—

	(Tons)
Fireclay refractories	175,000
Silica ,,	34,000
Basic ,,	5,000
High alumina ,,	1,500
Cement and mortar	40,000
Others	25,000
TOTAL	280,500

Demand.—The current demand for refractories is estimated at about 280,000 tons per annum. The major consuming industries are indicated below:—

Name of the industry	Annual demand (Tons)
1. Iron and steel	180,000
2. Glass	12,000
3. Ceramics	4,000
4. Refractories	12,000
5. Cement	12,000
6. Railways (Foundries)	7,000
7. All others	50,000
TOTAL	277,000

Capital and labour.—The capital investment in the industry is estimated to be about Rs. 7 crores, inclusive of working capital. The industry provides employment to about 13,000 persons. Of this total about 2,000 are supervisory personnel and skilled labour and the rest, semi-skilled and unskilled labour.

Raw materials.—Fireclay and coal are the two major raw materials of the industry. Fireclay is found in fairly abundant quantities in almost all parts of the country. The areas where coal occurs are naturally in an advantageous position with regard to the development of the refractory industry. Consistent with the demand for refractories, the industry has, therefore, developed in the areas of Bengal-Bihar and also to an appreciable extent in Madhya Pradesh.

Apart from fireclay and coal, the manufacture of basic, silica and other types of refractories requires certain other minerals, most of which are available in the country. Chrome ore required for the manufacture of chromite bricks is found in the Singhbhum District of Bihar, in Orissa, Mysore and Bombay; and the magnesite deposits of Madras and Mysore form an abundant source of raw material for the manufacture of magnesite bricks. Dolomite which is used in the manufacture of dolomite bricks is also abundantly available. Other minerals used for the manufacture of refractories and found in India are kyanite and sillimanite. India is thus in a favourable position to produce refractories not only for internal requirements but for export also. Since the manufacture of these refractories has not been adequately developed in the country, substantial quantities of these minerals are at present exported. The following table indicates the extent of such exports in recent years:—

	Unit	1951-52	1952-53	1953-54	1954-55	1955-56 (Ten months, April to January)
Chromite	Tons	8,678	10,327	22,567	17,650	43,143
Kyanite	,,	22,592	21,621	15,168	25,650	25,494
Sillimanite	,,	3,293	3,710	2,530	2,650	3,542

On the basis of the current pattern of capacity the requirements of raw materials including coal for achieving full production have been estimated as under:

	(Tons)
Coal	250,000
Fireclay	520,000
Bauxite and kyanite	40,300
Silica stone	40,000
China clay	2,500
Magnesite	16,000
Chrome ore	5,700
Feldspar	500
TOTAL	875,000

II. Programme of Development in the Second Plan

Estimated requirements.—For estimating the requirements of refractories during the Second Plan period, a number of factors have to be taken into account, the most important of which is the expansion of the steel industry. The steel industry's requirements of refractories for (i) construction and (ii) operation are estimated to be as follows:—

New steel plants.—The construction of the Rourkela Steel Plant with one million ton ingot capacity has been taken in hand. It has been decided that this plant will operate on the basis of the L. D. process. The requirements of refractories for its construction and the recurring demand after it goes into production are estimated to be as under:—

	Constructional demand (Tons)	Recurring demand (operational) (Tons)
Fireclay	65,100	22,900
Silica	27,100	8,950
Magnesite	2,350	1,400
Chrome-magnesite	920	960
Insulating	3,830	1,250
Sillimanite	150	150
Carbon	2,500	..
TOTAL	101,950	35,610

For the Madhya Pradesh steel plant (capacity one million tons of ingots) the requirements of refractories have been estimated as follows:—

	Constructional demand (Tons)	Recurring demand (operational) (Tons)
Fireclay special	11,835	27,120
,, 1s8	19,087	
,, 1s6	53,371	
Silica	39,340	16,700
Magnesite	3,000	3,000
Chrome-magnesite	3,400	5,330
Fireclay insulating	335	250
Diatomic or vermiculite bricks	1,190	..
Carborundum	110	100
TOTAL	131,668	52,500

A third steel plant in the public sector is proposed to be set up at Durgapur. This plant will also have a capacity of one million tons. The requirements of this project have roughly been estimated as 130,000 tons and 60,000 tons respectively during the constructional and operational phases.

It may be mentioned that these estimates do not take into account refractory cement and mortar required during the constructional and operational phases. Including refractory cement and mortars, the total requirements of refractories for the construction of new steel plants have been estimated at about 540,000 tons.

Expansion of existing steel works.—The existing steel plants in the private sector are also being expanded during the Second Plan period. The capacity of the Tata Iron and Steel Co. is being raised to 2 million tons of ingots. The Indian Iron and Steel Co. have an expansion programme which will step up capacity to 1 million tons of ingots. The capacity of the Mysore Iron and Steel Works is also proposed to be expanded to 100,000 tons of finished steel. The total requirements of refractories (including refractory cement and mortar) for these expansion schemes during the construction stage is estimated at about 320,000 tons. The recurring demand for refractories from steel plants in the private sector, after full capacity has been achieved, is estimated to be of the order of 316,000 tons per annum. This has been estimated on the basis of the present rates of consumption of refractories in the existing steel works. In modern steel furnaces, the replacement demand for refractories is substantially smaller and it is likely that the replacement requirements of the steel units in the private sector after full expansion may, in fact, be somewhat lower than the estimate indicated here.

The demand arising out of constructional requirements is not a steady demand but will taper off after these schemes have been completed. The construction of new steel plants in the public sector as well as the expansion programmes of steel units in the private sector are expected to be largely completed by the end of 1959. The constructional demand for refractories will thus mainly arise during the period 1956-59. The demand is likely to be spread over these three years almost in equal instalments. The annual requirements of refractories for the steel industry during the first three years of the Plan is estimated at about 441,000 tons. This includes 180,000 tons for the three steel plants in the public sector, 107,000 tons for the expansion programme in the private sector and 154,000 tons on account of the operational requirements of TISCO, IISCO and Mysore Iron and Steel Works during this period.

During the last two years of the Plan the demand for refractories will arise on account of the operational requirements of all the steel plants which will by then have been completed. The total capacity of the steel industry by this time will be roughly of the order of 6 million tons of ingots and assuming full production, the recurring demand for refractories is likely to be of the order of 506,000 tons per annum.

The following table indicates the estimated requirements of important types of refractories for the steel industry for the periods 1956-59 and 1959-61.

Annual requirements of refractories ('000 tons)

	Fireclay	Silica	Basic	Insulating and others	Refractory cement mortar	Total
Period 1956-59 :						
1. Operational requirements of TISCO, IISCO and Mysore Iron and Steel Works	80	18	8	18	30	154
2. Constructional requirements for expansion of the above plants	60	20	3	4	20	107
3. Constructional requirements of the 3 steel plants in the public sector	80	40	6	4	50	180
TOTAL	220	78	17	26	100	441
Period 1959-61 :						
1. Operational requirements for TISCO, IISCO and Mysore Iron and Steel Works	160	40	16	40	60	316
2. Operational requirements of the three steel plants in the public sector	75	40	9	6	60	190
TOTAL	235	80	25	46	120	506

Other industries.—Expansion programmes envisaged for a number of other industries, apart from steel, will also swell the demand for refractories though the quantum of such increase may not be very substantial as compared to the requirements of the steel industry. The more important industries which will account for an increased consumption of refractories are:—

1. *Cement industry.*—The Second Plan visualises more than 200 per cent increase in the capacity of the cement industry which is an important consumer of alumina bricks in the rotary furnaces. The requirements of refractories for this industry is estimated to be 36,000 tons by 1960-61.

2. *Glass and ceramic industries.*—Glass and ceramic industries are also important consumers of refractories. The demand for refractories from these industries is estimated at 22,000 tons by the end of the Second Plan,

3. *Refractory industry.*—The refractory industry itself consumes substantial quantities of refractories. Taking into account the expansion programmes of this industry during the Second Plan (*vide infra*) the requirements are estimated at 40,000 tons by 1960-61.

4. *Railways.*—The Railways at present consume about 7,000 tons of refractories. Their requirements are expected to be up to 20,000 tons by 1960-61.

Apart from the industries mentioned above, refractories are consumed in small quantities in boilers, coke-ovens, etc. These requirements are placed at about 80,000 tons by 1960-61.

The demands from industries other than steel are summarised in the following table:

Industry	Demand (Tons)
Glass	
Ceramics	16,000
Refractories	6,000
Cement	40,000
Railways	36,000
Others	20,000
	80,000
TOTAL	198,000

It may also be assumed that the expansion of the steel industry will continue steadily even after the Second Plan. The steady demand for refractories for new constructions can be placed at about 100,000 tons per annum.

Taking all these factors into consideration, the demand for refractories by the end of the Second Plan is estimated at about 800,000 tons per annum. The following table gives a broad indication of the categories of demand for refractories by 1960-61 :—

Type of refractories	Requirements by 1960-61 (Tons)
Fireclay	
Silica	460,000
Basic	100,000
Insulating bricks	40,000
Refractories, cement/mortar	60,000
	140,000
TOTAL	800,000

Targets of capacity and production.—In view of the basic importance of refractories it is necessary to plan for the production of the entire requirements anticipated by the end of the Second Plan period. Thus, a production of 800,000 tons of refractories is envisaged by 1960-61. To allow for the normal gap between capacity and production, it is desirable to plan for a target capacity somewhat higher than the estimated requirements. Taking a stream efficiency of 80 per cent, the installed capacity of the industry would, therefore, have to be stepped up to 1 million tons by the end of the Second Plan period.

Schemes licensed and under implementation.—A number of schemes designed to increase the capacity of the industry have been licensed or recommended for license under the Industries (Development and Regulation) Act. Details of these schemes are given below:—

Area	Name of the factory	Item	Additional capacity (Tons)
	(i) *Expansions*		
Bihar	1. Kumardhubi Fireclay and Silica Works	Firebricks	26,400
	2. Tata Iron & Steel Co.	Magnesite, chrome and chrome-magnesite.	4,320
	3. Bihar Firebricks & Potteries	Silica refractories	6,000
	*4. Burn & Co.	Fireclay, silica and basic refractories.	37,200
	5. Reliance Firebricks & Potteries	Silica and basic refractories.	18,000
Madhya Pradesh	6. Associated Cement Co.	Fireclay bricks	11,600
	7. Ishwar Industries	Fireclay, silica and basic refractories.	22,800
	8. Perfect Pottery Co.	Firebricks	5,400
Orissa	9. Orissa Industries	Fireclay bricks	48,000
Madras	10. Dalmia Cement	Fireclay bricks	7,200
Delhi	11. Ishwar Industries	Fireclay bricks	10,200
		TOTAL	197,120
	(ii) *New schemes*		
Orissa	1. Killick Industries	Fireclay, silica and basic refractories	29,200
Bihar	2. National Cement Mines and Industries	Fireclay bricks	12,000
Mysore	3. Mysore Stoneware Pipes and Potteries	Do	6,000
Madhya Pradesh	4. S. N. Sunderson & Co.	Fireclay refractories	12,000
	5. Burn & Co.	Fireclay and silica refractories.	18,000
	6. Madhya Pradesh Refractories	Fireclay, silica and basic refractories.	30,000
Orissa	7. Orissa Cement	Fireclay, silica and basic refractories.	88,000
	8. Tata Iron & Steel Co.	Do	60,000
Madras	9. Orissa Cement	Dead burnt magnesite	36,000
West Bengal	10. Indian Refractories	Fireclay, silica and high alumina bricks	47,400
	11. Hind Refractories	Fireclay bricks	30,000
		TOTAL	368,600

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*Part of the expansion programme of dead burnt magnesite is proposed in Madhya Pradesh and Madras.

Some of these projects are at an advanced stage of implementation and are expected to come into production during 1956. When all the above schemes are implemented, the capacity of the industry will go up to about 973,700 tons per annum.

The break-up of this capacity by important types of refractories will be as follows:—

	Existing capacity	Additional capacity approved or recommended	Total
	(Tons)	(Tons)	(Tons)
1. Fireclay	320,000	312,200	632,200
2. Silica	30,000	122,600	152,600
3. Basic	10,000	73,120	83,120
4. High alumina	10,000	5,400	15,400
5. Insulating	4,000	..	4,000
6. Cement/mortar	70,000	16,400	86,400
	444,000	529,720	973,720
	(Plus	36,000	36,000
	of dead burnt magnesite)		

In addition to these schemes, four more proposals involving a total annual capacity of 53,540 tons of various categories of refractories have been received. These are at present under the consideration of the Ministry of Commerce and Industry.

Additional capacity required.—Compared to requirements, the capacity so far licensed or recommended for license seems to be adequate in respect of most of the items except insulating bricks and refractory cement and mortar. The manufacture of the latter is envisaged in the new steel factories and shortages are not likely to be experienced for this item. On the other hand, there is need for more capacity for insulating bricks. This gap has to be bridged by encouraging the undertaking of further schemes during the Second Plan period.

Investment.—The targets of capacity and production which have been suggested involve a substantial expansion of the refractory industry during the Second Plan period. The bulk of the investment on new units and expansions visualised to bring about a capacity of 1 million tons as against 440,000 tons at the end of the First Plan will be incurred during the Second Plan period, although some expenditure will have been incurred during the First Plan on schemes which have been already licensed. The total investment required during the Second Plan period to achieve a capacity target of 1 million tons is estimated to be about Rs. 9 crores. This involves more than doubling the existing capital investment of the industry and such a rapid rate of development may involve substantial assistance from institutional agencies. The National Industrial Development Corporation has given a high priority to this industry and it is expected that if necessary it will take the initiative in regard to the production of special refractories.

Miscellaneous.—The large demand for refractories arising out of the constructional programme of the steel factories has been indicated earlier. This demand is concentrated during the first three years of the Plan and will call for substantially increased supplies of refractories from 1956-57 onwards. It may be difficult to obtain refractories in the required quantities from indigenous sources during this period and imports may have to be resorted to. Such imports during the period 1956-59 may be of the order of 150,000 tons valued at Rs. 4 to 4·5 crores. This emphasises the need for augmenting the capacity of the indigenous industry in the immediate future. The schemes which have already been licensed should be enabled to be completed as early as possible by providing all reasonable facilities and assistance for their speedy and successful implementation.

The manufacture of special refractories has not yet been taken up in the country mainly because of the limited demand and the complicated 'know-how' involved. With the gradual expansion of consuming industries, the demand for some of these items may show an upward trend which might enable their manufacture in this country to become economic. Some of the refractories whose development might be considered are graphite refractories, silicon carbide refractories and electro-cast refractories.

The industry has to be developed along modern lines and in economic units. The smallest economic unit of the modern type is considered to be 70 tons per day or 23,000 tons per annum. This is based on the capacity of a medium-sized continuous tunnel kiln which is capable of firing 70 tons of firebricks per day. In the future expansion of the industry, units of 70 tons or above per day should be encouraged. For chamber kilns, a daily capacity of 30 tons is deemed to be economic. For special refractories the economic unit for this purpose may be taken as 6 tons per day.

The following table summarises the development of the industry envisaged during the period of the Second Plan:—

	1955-56	1960-61
	(Tons)	(Tons)
Annual rated capacity	444,000	1,000,000
Production	280,000	800,000

37. GLASS

I. Review of Progress in the First Plan

Targets.—The Planning Commission estimated that the requirements of glass and glassware (excluding bangles) would be 163,500–168,500 tons per annum by 1955-56, of which 15,000 tons were expected to be required for export, distributed equally between sheet glass and blown and pressed glassware. Imports were estimated to drop from a value of Rs. 57 lakhs in 1950-51 to Rs. 20 lakhs in 1955-56.

Accordingly, the production target for glass industry was fixed at about 168,500 tons for 1955-56. On the basis of the schemes under implementation at the commencement of the First Plan, the capacity was expected to reach 290,000 tons by 1955-56. The production of bangles was expected to keep steady at about 16,000 tons per annum during the Plan period.

Capacity and production.—In 1951 there were 142 glass factories in India with an installed capacity of about 213,250 tons per annum. Of these, 35 units with a capacity of about 30,000 tons had been closed for over three years. There are at present 131 glass factories registered under the Industries (Development and Regulation) Act, 1951, with an installed capacity of about 314,500 tons. Of these, 84 units with a capacity of about 247,000 tons are actually working. 25 factories with a capacity of about 44,000 tons are temporarily closed and 22 with a capacity of about 23,000 tons are, more or less, permanently closed. The effective capacity of the industry may, therefore, be taken at about 291,000 tons per annum. The State-wise distribution of this capacity is tabulated below:—

	Number of factories	Installed capacity
		(Tons)
West Bengal	28	90,800
Uttar Pradesh	24	63,900
Bombay	18	49,100
Madras	9	10,800
Bihar	8	39,600
Madhya Pradesh	5	3,660
Punjab	3	9,300
Delhi	3	4,400
Hyderabad	2	4,800
Rajasthan	2	2,700
Mysore	2	1,160
Other States	5	10,800
TOTAL	109	291,020

The effective capacity of the industry for different types of glass and glassware is given below:—

Item	Capacity (Tons)		
	Working	Temporarily closed	Total
Bottles and phials	120,000	20,500	140,500
Sheet glass	35,640	14,760	50,400 (94 million sq. ft.)
Table and pressedware	38,000	2,450	40,450
Lampware	29,000	4,200	33,200
Scientific glassware	4,340	1,680	6,020
Shells for electric lamps	1,220	Nil	1,220 (27·5 million pieces)
Thermos flasks	860	Nil	860 (120,000 dozen)
Miscellaneous glassware	19,380	510	19,890
TOTAL	248,440	44,100	292,540

The total of the item-wise capacity, *viz.*, 292,540 tons, is a little more than the effective capacity of 291,020 tons given earlier as the capacity for some of the items is interchangeable. The increase in capacity during the First Plan was substantial in the field of sheet glass through the commencement of production by two new units, *viz.*, the Sodepur Sheet Glass Factory and the Hindusthan Pilkington Glass Works.

In addition to the organised factories registered under the Industries (Development and Regulation) Act, there are a large number of small units working on a cottage scale and manufacturing mainly bangles and beads. The estimated capacity of the bangle industry, which is mainly concentrated in the town of Firozabad, Uttar Pradesh, remained unchanged at 35,000 tons per annum during the First Plan period.

The production of different types of glass and glassware from 1950 onwards is given below:—

		1950	1951	1952	1953	1954	1955
Bottles and phials	(Tons)	51,850	50,640	50,220	40,750	47,840	55,270
Sheet glass	(Tons)	5,100	5,800	4,780	11,990	17,950	20,540
	(Million sq. ft.)	(9·6)	(11·1)	(9·05)	(22·7)	(33·0)	(38·9)
Table and pressedware	(Tons)	12,950	15,340	17,920	17,620	22,050	25,460
Lampware	(Tons)	13,150	16,340	15,580	12,400	12,660	16,690
Scientific glassware	(Tons)	2,140	2,000	1,500	1,320	1,510	2,500
Shells for lamps	(Tons)	N.A.	620	740	750	1,000	1,160
	(Million pieces)	..	(14·0)	(16·7)	(16·9)	(22·5)	(26·1)
Thermo flasks	(Tons)	N. A.	330	110	290	180	315
	(Dozen)	..	(45,900)	(15,300)	(40,200)	(25,000)	(43,700)
Miscellaneous glassware	(Tons)	1,990	2,080	1,230	960	2,450	2,270
TOTAL	(Tons)	87,180	93,150	92,080	86,080	105,640	124,205

As is evident from the figures of production tabulated above, the output of glass and glassware in 1955 has shown a considerable improvement over that in the previous years. Nevertheless, the estimated production in 1955-56, *i.e.*, 125,000 tons, will fall short of the production target of 168,500 tons. This is mainly due to lack of sufficient demand for a number of products of the industry and the gap between actual exports of glass and glassware and the target envisaged under the First Plan. The fall in production during 1952 and 1953 was mainly due to the general recession in trade in the country during these years.

The production of glass bangles has been running, more or less, steady at about 16,000 tons per annum during the Plan period.

Manufacture of new items.—Penicillin vials, sheet glass of sizes less than 16 ozs. and over 32 ozs., glass tubing by automatic drawing, narrow-mouth thermos flasks and decorated aerated water bottles are some of the items, the manufacture of which was undertaken for the first time in the country during the First Plan. Manufacture of optical glass, for which provision was made in the National Instruments Factory, Calcutta, had to be deferred to the Second Plan mainly due to the delay in settling the scope of the project and the terms of collaboration with some foreign firm. The establishment of a pilot plant to experiment with the production of optical glass in the Central Glass and Ceramic Research Institute, Calcutta, has recently been decided upon. Its annual capacity is envisaged at about 5 tons and it is expected to involve an expenditure of Rs. 7 lakhs (Rs. 5 lakhs non-recurring and Rs. 2 lakhs recurring).

Imports and exports.—The imports and exports of glass and glassware from 1950-51 onwards have been as follows:—

Imports

(Rs. lakhs)

	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56 (Ten months, April to January)
Sheet and plate	30·73	1,43·43	57·47	68·32	66·54	57·38
Bottles and phials	11·06	11·28	12·00	19·47	13·81	3·69
Beads and false pearls	1·18	14·65	12·42	2·88	7·02	17·53
Scientific glassware	2·01	5·00	4·87	1·81	4·08	3·27
Funnels, globes and glass parts of lamps	0·14	2·72	3·80	3·05	2·70	1·84
Tableware including decanters, tumblers, etc.	0·20	0·27	1·37	5·16	5·31	3·84
Thermos flasks	N. A.	N. A.	N. A.	11·18	10·86	8·27
Other glass and glassware	12·88	37·38	37·09	24·40	28·37	42·50
TOTAL	58·20	2,14·73	1,29·02	1,36·27	1,38·69	1,38·32

Exports

	(Rs. lakhs)
1950-51	27·45
1951-52	41·53
1952-53	31·68
1953-54	26·67
1954-55	24·45
1955-56 (Ten months, April-January)	23·89

The exports of glass and glassware are not reported by quantity. These may be roughly estimated as 5,000-6,000 tons during 1954-55 as against the target of 15,000 tons envisaged in the Plan.

Consumption.—On the basis of production plus imports minus exports, the internal demand for various types of glass and glassware in 1955-56 may be roughly estimated* as follows:—

Item	(Tons)	
Bottles and phials	60,000	
Sheet glass	22,000	(40 million sq. ft.)
Table and pressedware	25,000	
Lampware	16,000	
Scientific glassware	4,000	
Shells for lamps	1,200	(27 million pieces)
Safety glass	600	(0·5 million sq. ft.)
Thermos flasks	500	(70,000 dozen)
Optical glass including ophthalmic glass	200	
Miscellaneous glassware	6,000	
TOTAL	135,500	

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* It is difficult to estimate the demand precisely as the imports and exports of glass and glassware are reported in value only.

Quality.—Good progress has been made by a number of glass factories in improving the quality of the glass and glassware produced by them. New units have also been established to produce quality goods. Nevertheless, there is still ample room for improvement in the quality and finish of the products in a large part of the industry.

The quality and the output per man in India are low as compared with the standards in the more industrially advanced countries. There are too many works producing the same items and a majority of them do not achieve a good standard. Ill-designed furnaces and annealing lehrs consume in many cases more than twice the quantity of fuel necessary and, therefore, result in higher operating costs.

The Development Wing of the Ministry of Commerce and Industry propose to concentrate on improving the efficiency and quality of the indigenous production during the Second Plan.

Investment.—It is estimated that a gross fixed capital of Rs. 2·5 crores was invested in the glass industry during the First Plan.

Action on major recommendations: (a) Additional capacity for glass shells.—It was estimated that the annual requirements of glass shells for electric lamps would rise to 32 million pieces by 1955-56 and that the expected production would fall short of requirements by about 4 million pieces. The need for bridging this gap did not arise as the demand did not develop at the rate that was expected.

(*b*) *Mechanisation of the industry.*—It was recommended that the glass industry should examine the question of mechanisation and adopt it, wherever possible, to improve efficiency and lower the cost of production. During the Plan period, three existing factories *viz.*, Vibhuti Glass Works, Banaras (U.P.), Travancore Ogale Glass Works, Alwaye (Travancore-Cochin), and Durga Glass Works, Barang (Orissa) were equipped with automatic machinery for the manufacture of blown and pressedware. Three new units employing the latest techniques of production, *viz.*, Hindusthan Pilkington Glass Works, Asansol (West Bengal), Hindustan National Glass Mfg. Co., Calcutta and Seriakella Glass Works (Tube Plant), Calcutta, came into being during the same period.

(*c*) *Scientific Research.*—The Central Glass and Ceramic Research Institute, Calcutta, which was opened in August 1950, has been engaged in improving the quality of glass and ceramic products, in finding substitutes for raw materials in short supply, in developing new products and processes and in giving technical assistance to the industry.

Tariff protection.—Protection which was granted to the sheet glass industry from April 1, 1950 onwards, was extended to the end of 1957 after a detailed enquiry into the industry by the Tariff Commission during 1953 and 1954. The rate of protective duty was raised from 47½ per cent *ad valorem* to 70 per cent *ad valorem* with effect from January 1, 1955.

II. Programme of Development in the Second Plan.

Estimated requirements: (*a*) *Bottles and phials.*—The development of the drugs and pharmaceuticals industry in the Second Plan will make an increasing demand for glass bottles and phials. The development of dairies and of fruit and vegetable preservation will also require a large tonnage of bottles. The prohibition policy envisaged in the Second Plan will, however, lead to a decrease in the demand for excise bottles. It is considered that the requirements of bottles and phials may increase from about 60,000 tons in 1955-56 to 90,000 tons in 1960-61.

(*b*) *Sheet glass.*—The general construction programmes are expected to increase by about 50 per cent in the Second Plan over those in the First Plan. The manufacture of safety glass by the Hindustan Safety Glass Works and the Pilkington Safety Glass Co. will open a new line of consumption for sheet glass. The demand for sheet glass may rise from about 22,000 tons in 1955-56 to 35,000 tons (64 million sq. ft.) in 1960-61.

(*c*) *Table and pressedware.*—The general rise in the purchasing power and in the standard of living of the people envisaged in the Second Plan is likely to increase the consumption of table and pressed glassware, which may rise from about 25,000 tons in 1955-56 to 35,000 tons in 1960-61.

(*d*) *Lampware.*—The demand for lampware is expected to increase from about 16,000 tons in 1955-56 to about 18,000 tons in 1960-61.

(*e*) *Other items.*—With the development of higher educational facilities and scientific research in the Second Plan, the demand for scientific glassware may be expected to rise considerably. The requirements may increase from about 4,000 tons in 1955-56 to 6,000 tons in 1960-61.

A production target of 50 million pieces per annum is envisaged for electric lamps by the end of the Second Plan. The glass industry will, therefore, be called upon to increase its production of shells from about 26 million pieces in 1955-56 to 55 million pieces (2,400 tons) in 1960-61.

The production of automobiles is expected to rise from about 25,000 in 1955-56 to 57,000 in 1960-61. The demand for safety glass may increase from about 600 tons (0·5 million sq. ft.) to 1,500 tons (1.25 million sq. ft.) during the same period.

The requirements of miscellaneous glassware may increase from about 6,000 tons to 12,000 tons during the Second Plan period.

To sum up, the domestic consumption of glass and glassware at the end of the Second Plan is estimated as follows:—

	(Tons)	
Bottles and phials	90,000	
Sheet glass	35,000	(64 million sq. ft.)
Table and pressedware	35,000	
Lampware	18,000	
Scientific glassware	6,000	
Shells for lamps	2,400	(55 million pieces)
Safety glass	1,500	(1·25 million sq. ft.)
Thermos flasks	750	(100,000 dozen)
Optical glass including ophthalmic glass	250	
Miscellaneous glassware	12,000	
TOTAL	200,900	

The annual demand for glass and glassware may thus be estimated at about 200,000 tons by 1960-61.

Schemes under implementation.—The following schemes have been licensed and are at present at various stages of implementation:—

Name of the scheme	Annual capacity
New schemes :—	
1. Indo-Japan Vacuum Bottle Co., Faridabad (Punjab)	48,000 dozen of thermos flasks.
2. Vishwa Traders, Bombay	960 tons of penicillin and vaccine vials, etc.
3. J. G. Industries, Bombay	1,200 tons of penicillin vials, bottles, battery jars, etc.
4. Sansar Oil Mills and Glass Works, Shahganj, Jaunpur (U. P.)	6,000 tons of glass tumblers, bottles and phials, etc.
Substantial expansions :—	
5. Travancore Ogale Glass Works, Alwaye (Travancore-Cochin)	1,500 tons of bottles.
6. Durga Glass Works, Barang (Orissa)	8,400 tons of glass bottles and pressedware.
7. Hindustan National Glass Mfg. Co., Calcutta	10,080 tons of glass bottles and pressedware.
8. Ogale Glass Works, Ogalewadi (Bombay)	720 tons of glass vials, etc.
9. Alembic Glass Industries, Baroda	10,800 tons of heat resisting pressedware, glass tiles, glass wool, etc.
10. Belur Glass Works, Calcutta	1,200 tons of crystal and coloured glassware.
11. Alembic Glass Industries, Baroda	216,000 gross glass vials.
12. Hind Lamps Co., Shikohabad, U. P.	12 million glass shells.

Besides the above, the Hindustan Safety Glass Works, Calcutta, have been permitted to establish a safety glass plant with an annual capacity of about 625,000 sq. ft. (750 tons) of safety glass and 62,500 sq. ft. of toughened glass. The factory is expected to start production about the middle of 1956. The Pilkington Safety Glass Co., Bombay, who were permitted in 1953 to undertake the manufacture of safety glass with a capacity of about 1 million sq. ft. (1,200 tons) have not made any progress so far. The terms of royalty in this case have been finalised only recently and the party now intend to go ahead with their scheme and commence production sometime during 1957.

In addition, the Bombay Co., Bombay and the Insulating Material Manufacturers, Bombay have been permitted to manufacture glass wool, mineral wool and allied products with an annual capacity of 1,200 tons in each case.

When the capacity which is at present under installation goes into production, the effective capacity of the industry will be raised to about 338,000 tons per annum.

Targets of capacity and production.—This capacity of 338,000 tons appears to be sufficient to meet the demand for various types of glass and glassware in the Second Plan except for shells for lamps. The capacity for shells, existing and under implementation, stands at about 40 million pieces as against the estimated demand of 55 million pieces in 1960-61. The existing units could perhaps expand their capacity to meet the demand as such development would be cheaper than establishing a new unit for the purpose.

The imports of glass and glassware stabilised themselves at a value of about Rs. 1,35 lakhs per annum during the triennium 1952-55. Exports averaged about Rs. 25 lakhs per annum during the same period. It is expected that at the end of the Second Plan exports and imports will balance each other at about Rs. 50 lakhs per annum. Items such as plate glass, for which the demand is not at present sufficient for the establishment of an economic unit, will continue to be imported during the Second Plan period. Ophthalmic glass may also have to be imported if the National Instruments Factory does not take up its manufacture in conjunction with their scheme for optical glass. Token imports of practically all items will continue in the Second Plan with a view to maintaining and improving the quality of the indigenous products.

To reach a level of Rs. 50 lakhs of exports per annum will require considerable effort. Exports shrank from about Rs. 42 lakhs in 1951-52 to Rs. 25 lakhs in 1954-55 as Indian products could not compete with others in the importing countries. The establishment of an Export Promotion Council is under consideration in the Ministry of Commerce and Industry.

Investment and employment.—It is estimated that the capital requirements of the glass industry inclusive of replacements and modernisation will amount to about Rs. 3 crores during the Second Plan period.

The glass industry in the organised sector is expected to employ about 25,000 persons in 1960-61 as against 18,500 persons in 1955-56 if the production target of 200,000 tons is achieved.

Requirements of raw materials.—To achieve a production of about 200,000 tons of glass and glassware in 1960-61 the industry will require the following quantities of the principal raw materials:—

	(Tons)
Glass sand	200,000
Soda ash	70,000
Lime	32,000
Borax	4,000
Saltpetre	800

Dense soda ash, the variety used by the glass industry, is at present imported and the supplies are sometimes irregular. The position is, however, expected to improve with the implementation of three schemes which have been licensed for the production of soda ash (both light and dense varieties).

The table below summarises the development programme of the glass industry (excluding bangles) in the Second Plan:—

	1955-56	1960-61
Capacity ('000 tons)	291	338
Production ('000 tons)	125 (Estimated)	200

38. PETROLEUM PRODUCTS

I. Review of Progress in the First Plan.

Targets.—At the commencement of the First Plan, practically the entire demand of the country for petroleum products was met by imports as the output of the Assam Oil Company's refinery at Digboi was little more than 5 per cent of the total requirements. Proposals were, however, under consideration for the manufacture of petroleum products by refining imported petroleum crude at Trombay and at a suitable port town on the East Coast. On the basis of the proposals which emerged by the end of 1951, the establishment of three refineries was accepted as part of the First Plan. Two of these proposed to be set up by the Standard Vacuum Oil Company of New York and the Burmah Shell Group of London respectively, were expected to be in production by early 1956, while the third proposed to be set up by the Caltex Company was not expected to be completed before April 1956.

On the basis of the construction schedules available in 1951, a production target of 403 million gallons of liquid petroleum products and 37,500 tons of bitumen was proposed for these new plants in the last year of the Plan. An overall investment of Rs. 64.6 crores was anticipated on the three new refineries.

Capacity and production.—During the First Plan period, the installed capacity for the refining of crude petroleum increased by 3.2 million tons with the installation of two new refineries at Trombay. The plant of the Standard Vacuum Oil Company went into production in August 1954. This plant has an annual capacity of 1.2 million tons in terms of input of crude oil. The Burmah Shell Refinery, Trombay which has an annual capacity of 2.0 million tons of crude petroleum was completed a year ahead of schedule. It commenced production in January 1955.

In addition, active work on the construction of the Caltex refinery at Visakhapatnam was commenced in early 1955. Since the publication of the First Plan, the size of this refinery has been changed and the capacity will now be to refine 0·675 million tons of crude petroleum per annum. An investment of Rs. 2.5 crores was expected to be incurred on this Rs. 12.5 crores project before the commencement of the Second Plan and the refinery is expected to go into production in 1957.

The Assam Oil Company, which is the only producer of mineral oils making use of indigenous petroleum crude, intensified their prospecting and exploratory operations during the First Plan. The company spent Rs. 5,61 lakhs on prospecting and development of new oil wells in the four years 1951-54 and completed 69 new wells. In 1954 a new gasoline plant and a new lubricating oil distillation unit were added to the refinery at a total cost of Rs. 58.5 lakhs. Their combined annual capacity is placed at 9.8 million gallons of gasoline and lubricating oil.

The production capacity of all the refineries by the end of 1957 would be of the order of 4·3 million tons in terms of crude processed per annum.

An idea of the increase recorded in the production of petroleum products under the First Plan can be had from the data relating to receipts of excise duty on mineral oils since 1950 reproduced below:—

	Rate of excise duty per gallon		Total receipts (Rs. crores)	
	Motor spirit Rs. as. ps.	Kerosene Rs. as. ps.	Motor spirit	Kerosene
1950-51	0 15 0	0 3 0	2·1	0·28
1951-52	0 15 9	0 3 0	2·1	0·26
1952-53	0 15 9	0 3 0	2·0	0·24
1953-54	0 15 9	0 3 0	2·5	0·33
1954-55	0 15 9	0 3 0	9·9	0·93
1955-56	0 15 9	0 3 0	*24·3	*2·55

*Estimated.

On account of the advance in the construction schedules of the two new refineries, the production targets envisaged under the Plan have been substantially exceeded.

Investment.—The actual fixed investment on the three new refineries during the First Plan is expected to be about Rs. 42 crores. Inclusive of the gross investments incurred on the plants at the Digboi refinery, the total fixed capital expenditure in the refining industry is estimated at Rs. 45 crores during 1951-56. In connection with these refineries, the promoting companies raised Rs. 12 crores by way of debenture loans in the Indian market in 1954-55.

Imports.—The imports of petroleum products during the Plan period were as under:—

		1950-51	1951-52	1952-53	1953-54	1954-55	1955-56 (April January)
Kerosene	Million gallons	229·4	254·5	265·8	299·1	310·2	189·6
Diesel oil	„	134·4	162·3	156·7	166·6	194·8	71·6
Other fuel oils	„	198·2	205·8	161·0	195·4	151·2	19·6
Lubricating oils	„	40·6	48·6	61·7	37·9	56·3	35·3
Motor spirit (including aviation spirit)	„	193·5	251·0	243·4	269·6	213·5	67·3
Other sorts	„	0·7	4·3	4·9	..	1·3	2·3
TOTAL	„	796·8	926·5	893·5	968·6	927·3	385·7

Consumption.—The consumption of petroleum products in 1950-51 was estimated at about 850 million gallons, and a 30 to 40 per cent increase in consumption was envisaged by the end of the First Plan. The actual increase in consumption was broadly in conformity with the forecast. The progressive dieselisation of road transport vehicles and the widespread use of tractors and diesel engines in agriculture has given an impetus to the consumption of high speed diesel oil. The consumption of kerosene has also shown a steady increase, its use being almost entirely for illuminating purposes.

Manufacture of jute batching oil and lubricating oil.—It was recommended in the Plan that the possibilities of producing jute batching oil and lubricating oil at the third refinery proposed to be established by the Caltex should be examined but it has not been found possible to include these items in the production pattern of the Caltex refinery.

Production of synthetic petrol.—The question of the manufacture of synthetic oil from low grade coal available in the country has been under consideration for a number of years. Various schemes were formulated in this regard but none of them were accepted primarily because of the heavy outlay involved. Furthermore, since the last project reports were drawn up, there has been a good deal of progress in the development of technique in the U. S. A. and Germany. It was thought, therefore, that in order to take stock of the latest developments, it would be necessary to obtain fresh reports from a selected number of firms of international repute.

In May 1954, the Government appointed the Synthetic Oil Committee to advise them in regard to the desirability of setting up a plant for the production of synthetic oil in the country. In pursuance of the recommendation made by this Committee in June 1955, the Government invited three foreign firms, Messrs. Heinrich Koppers, Messrs. Lurgi, Germany and Messrs. M. W. Kellogg, U. S. A. to prepare project reports providing (a) for the production of 250,000-300,000 tons of liquid fuels per year and (b) for alternative schemes, if considered necessary, involving straight Fischer-Tropsch process alone or a combination of the Fischer-Tropsch process and the tar-hydrogenation process. Simultaneously, an Experts Committee was also appointed to give guidance, if needed, to the foreign firms in the preparation of the project reports and also to scrutinise the project reports. The project reports from the three firms were examined by the Experts Committee who recommended a project for implementation under the Second Plan. This project envisages the manufacture of soft coke from non-coking coal and utilisation of the by-products for the production of synthetic petrol.

Establishment of further refining capacity.—Proposals were forwarded in 1955 by private enterprise for the establishment of a refinery on the coast of Saurashtra based on imported crude. On the basis of new source of oil struck by them at Narkotiya, the Assam Oil Company have also been considering a proposal for setting up a refinery in conjunction with the Government. The Standard Vacuum Oil Company have also shown interest in eventually establishing a refinery in the eastern part of India where, in the opinion of geological experts, the discovery of naturally occurring crude petroleum is a possibility. They obtained in 1954 a licence for prospecting for oil and the Government have agreed to participate in the prospecting expenditure up to 25 per cent on the understanding that they will have a similar share in the exploitation of any oil that may be discovered. The results of intensified prospecting for oil are expected to be known in the early years of the Second Plan. A proposal has also been made by the Standard Vacuum Refinery Company for increasing the capacity of the Trombay plant including thereunder the manufacture of jute batching oil, among the various items to be produced.

II. Programme of Development in the Second Plan

Estimated requirements.—It is difficult to make an assessment of requirements of mineral oils over a long period except on the basis of general trends of consumption in the past. A forecast can be easily upset if for any reasons there is any marked change in the relative prices of coal, petroleum fuels and electricity. During the Second Plan, diesel oil is expected to be increasingly used in road transport but the general increase in road transport consequent on higher levels of industrial and agricultural production is also expected to give an impetus to petroleum consumption. The ships built at Visakhapatnam shipyard are being designed for diesel propulsion so that shipping would also depend on fuel oils in larger measure in future years. The Railways also have under the Second Plan an extension of dieselisation covering an additional 1,293 miles by 1960-61. It is provisionally envisaged that the consumption of petroleum products would by 1960-61 register an increase of 45 to 50 per cent over the level at the end of the First Plan.

Targets of capacity and production.—The capacity that would be in existence by 1957 on the completion of the Caltex Refinery *viz.*, 4·3 million tons in terms of crude processed, will be inadequate for meeting the expanding requirements of petroleum products. The establishment of additional facilities for petroleum products is, therefore, *prima facie* necessary and desirable. It is, however, closely linked with the exploratory work on the occurrence of oil that has been proposed to be taken up. A synthetic petrol project will obviously have a low priority, if the existence of deposits of petroleum crude is proved in the country. The Plan does not, therefore, make any provision for this project, a final decision on which can be taken after more is known of the prospects of obtaining crude petroleum from indigenous sources.

39. POWER ALCOHOL

I. Review of Progress in the First Plan

Targets.—The position of the power alcohol industry at the beginning of the First Plan and the targets of capacity and production envisaged by 1955-56 are summarised in the following table:—

		1950-51	1955-56
Number of distilleries		19	31
Total installed capacity			
(i) Power alcohol	(Million gallons)	12·87	21·12
(ii) Commercial spirit	„	12·65	2·95*
Actual production			
(i) Power alcohol	„	4·72	18·00
(ii) Commercial spirit	„	3·50	2·00*

*Refers to output of power alcohol distilleries only.

Capacity and production.—In 1950-51 there were in existence 19 power alcohol distilleries with an annual rated capacity of about 12·87 million gallons of power alcohol. Since then, there has been no increase in the number of units. The annual rated capacity of the industry was, however, reassessed in 1954 and was placed at 14·9 million gallons. There has been no change since then in the capacity which remains at the same level. Power alcohol factories simultaneously produce a certain quantity of industrial alcohol, the capacity for which is estimated at 2·9 million gallons. In addition, there are 24 distilleries producing potable and industrial alcohol. The capacity of these units for industrial alcohol is estimated at 9·3 million gallons. Thus at present the capacity for industrial alcohol is estimated at 12·2 million gallons per annum.

The geographical distribution of the distilleries producing power and industrial alcohol is indicated below:—

State	Factories equipped to produce power alcohol and industrial alcohol			Factories producing potable and industrial alcohol	
	Number of units	Annual rated capacity '(000 bulk gallons)		Number of units	Annual rated capacity ('000 bulk gallons)
		Power alcohol	Industrial alcohol		
1	2	3	4	5	6
Uttar Pradesh	12	10,164	1,345	4	1,440
Bihar	2	1,290	216	3	1,098
Bombay	2	1,090	540	3	1,447
Hyderabad	1	1,020	60	..	..

1	2	3	4	5	6
Mysore	1	540	540	1	300
PEPSU	1	800	200	..	..
Punjab	..	..	..	2	816
Madras	..	..	..	1	720
Travancore-Cochin	..	..	..	1	180
West Bengal	..	..	..	3	1,550
Andhra	..	..	..	3	1,224
Vindhya Pradesh	..	..	..	1	240
Rajasthan	..	..	..	1	187
Bhopal	..	..	..	1	180
TOTAL	19	14,904	2,901	24	9,382

It was envisaged that 12 new distilleries producing power alcohol would be set up during the Plan period. Plans for the establishment of five of these, four in Madras and one in Madhya Bharat, at a capital cost of Rs. 20 lakhs were under consideration at the beginning of the Plan. These were expected to go into production by 1953. Seven more distilleries were recommended to be set up during the period 1953-56—4 of them with a combined capacity of 3·6 million gallons in Bihar and 3 with a capacity of 1·5 million gallons in Bombay—on the basis of additional supplies of molasses which were expected to become available with the increased production of sugar. No progress has, however, been made on these schemes. The failure of the industry to expand appreciably is due to the shortage of molasses and also to the fact that in many areas the production of power alcohol for sale as motor spirit is not economic either because the distance of the distilleries from the sugar factories puts up the costs of production or because the price of petrol, especially near the port towns, is low.

Difficulties in the supply of molasses and offtake has kept production at a low level compared to the installed capacity. This was particularly true in the case of distilleries in Eastern Uttar Pradesh and PEPSU. A distillery in PEPSU which was set up before 1951 has not so far been able to start production for want of adequate quantities of molasses. Molasses could not be made available to this unit from Uttar Pradesh as was recommended in the Plan, nor was it possible to shift this distillery to any better location.

The production of power and industrial alcohol during the past six years has been as follows:—

Year	Power alcohol	Industrial alcohol
	(Million gallons)	(Million gallons)
1950	4·5	3·4
1951	5·7	5·0
1952	7·7	4·7
1953	8·1	4·4
1954	8·0	4·6
1955	10·4	5·2

The production of power and industrial alcohol though much below the installed capacity has shown a fairly steady increase over the 1950 level. The increase in production has been almost entirely secured by the fuller utilisation of existing capacity. The additional facilities made available for the transport of molasses and power alcohol were also a contributory factor in achieving higher production. The production of power alcohol, however, falls far short of the target of 18·0 million gallons envisaged in the Plan.

Imports and exports.—Imports of alcohol are banned, but small quantities are imported along with drugs and perfumed spirits or in the form of liquors. Exports of alcohol are confined to despatches of denatured spirit to Burma and Ceylon and small quantities of rum.

Consumption.—Consumption of power alcohol was envisaged at 18·0 million gallons in 1955-56 as against 4·7 million gallons in 1950-51. As is evident from the figures of production, consumption in 1955-56 is expected to be only about 10 million gallons. Further expansion of consumption was impeded by difficulties in providing facilities for mixing petrol with alcohol and by the comparatively high cost of production of alcohol in certain areas.

As against 3·4 million gallons in 1950, the consumption of industrial alcohol is estimated to have gone up to 5·2 million gallons by 1955. In addition about 0·6 million gallons of alcohol are at present used in the manufacture of acetate rayon and are met from the production of power alcohol grade spirits.

Capital and labour.—According to the Census of Manufacturing Industries, 1953, the fixed capital investment in the 47 distilleries and breweries (including power alcohol manufacturers) in the country was of the order of Rs. 2,47 lakhs in 1953. The number of persons employed in the industry in 1953 was estimated at about 4,750.

Action on main recommendations.—(i) It was recommended in the First Plan that the use of petrol-alcohol mixture should be extended to all the areas adjoining the manufacturing units and provision for additional mixing depots and storage facilities and distribution arrangements should be given high priority. The number of depots for mixing power alcohol with petrol has increased from 43 in 1951 to 83 at present. The Indian Power Alcohol Act has been enforced over the entire Uttar Pradesh, Delhi, Punjab, PEPSU and Himachal Pradesh States, in large parts of Vindhya Pradesh, and in the Nasik District and adjacent areas of the Bombay State. The Bihar Power Alcohol Act continues to be in force in large parts of Bihar State and the Central Act has not replaced it so far. The Power Alcohol Act was also enforced in parts of Hyderabad, but with the diversion of alcohol production to the manufacture of chemicals required for the acetate rayon plant, the power alcohol scheme was discontinued. Facilities for transport of molasses also improved during the Plan period due to provision of a larger number of tank wagons.

(ii) The establishment of an all-India agency for acquiring the output of power alcohol from distilleries and its distribution through petroleum companies was also recommended in the Plan. The possibility of entrusting the oil companies with the entire responsibility for the purchase and mixing of power alcohol produced at specified distilleries was examined by the Ministry of Commerce and Industry. Due to lack of adequate response from the oil companies, however, this scheme had to be abandoned. Adjusting the selling rates in accordance with the actual cost of power alcohol also did not find favour as it was likely to lead to an increase in the cost of the mixture in some States.

Problems of the industry.—The major problem facing the industry is stated to be the unremunerative price of power alcohol. Difficulties in the supply of molasses were also responsible for the intermittent working of some of the distilleries, but these have been overcome to some extent. In Bihar the cost of production of power alcohol is said to be more than in Uttar Pradesh on account of the higher overall cost of molasses to the distilleries in that area. However, the cost of production might be brought down at some of the units by paying greater attention to economy in steam consumption etc.

As regards industrial alcohol, the diverse excise rules and regulations existing in different States and the varying rates of duty and other charges levied on this commodity have also created many difficulties which have perhaps stood in the way of developing larger industrial uses for alcohol. The industry is also called upon to pay penalties when losses of spirit occur in transit. With the introduction of prohibition in some of the States, these restrictions have become all the more rigorous and have had the effect of hampering the progress of the industry considerably.

With a view to suggesting ways and means of overcoming these difficulties and to ensure a steady growth of the industry, a Committee was set up by the Ministry of Commerce and Industry in October 1955. This Committee, which is expected to submit its report shortly, is reviewing the problems of the industry, including the mechanics of excise control over alcohol, and is expected to make recommendations on the manner in which the total alcohol production in the country can be fully utilised either as power alcohol or for industrial purposes and on the industries which can be expanded or established having regard to the increase in the availability of alcohol for industrial purposes in the country.

II. Programme of Development in the Second Plan

Estimated requirements.—Power alcohol can be mixed with petrol to the extent of 20 per cent for use as motor fuel. Theoretically this offers enormous scope for stepping up the consumption of power alcohol. In fact, if all the petrol used in the country were mixed with power alcohol in the above proportion, it would not be possible to produce even 50 per cent of the power alcohol required even assuming that the entire quantity of molasses produced were utilised only for its manufacture. In actual practice, however, the offtake of power alcohol is conditioned by a number of factors like the cost of production, the facilities for mixing it with petrol etc. The trend of consumption in the past calls for moderation in the assessment of the possibilities. While it has been possible to develop the industry in areas like the Uttar Pradesh where the availability of molasses in close proximity to power alcohol factories was conducive to its economic production, factories in other areas like Bombay have found it difficult to produce it at a low enough cost to enable it to be sold as motor spirit at the current price of petrol, after paying for the expenses of mixing and marketing operations. The present position is that all the areas where the price realised by the sale of power alcohol as motor spirit leaves sufficient margin for a fair return to the producers have been covered. Any increase in the production of power alcohol above the present level will depend upon developing consumption in other areas and a statisfactory solution of the problems of enforcing the Indian Power Alcohol Act in areas where the price obtained by its sale as motor spirit is insufficient to yield a fair return to the producer. If it were possible to subsidise the sale of power alcohol in uneconomic areas it would help in increasing its consumption. However so far no agreement has been reached on this question. It is expected that the Committee appointed by the Ministry of Commerce and Industry will make suggestions and recommendations for stepping up the consumption of alcohol either as motor fuel or as industrial alcohol so that the overall production can be increased.

The additional supplies of molasses that will become available with the establishment of more sugar factories during the second Plan may, to some extent, relieve the problem of shortage of molasses in certain regions. For example, additional sugar crushing capacity of 222,000 tons in Bombay, 12,000 tons in Bihar, 6,000 tons in Punjab and 4,000 tons in PEPSU had been licensed up to December 1955. Scope for the production of alcohol in these areas will, therefore, improve to a substantial extent. Taking these factors into consideration, the utilisation of about 18 million gallons of alcohol as motor fuel by 1960-61 is envisaged.

The use of alcohol as motor fuel can by no means be regarded as the most useful or economic outlet for this product. While its consumption as motor fuel has to be permitted and even encouraged in the immediate future as a means of fostering the development of the alcohol industry, a steady and permanent demand for alcohol has to be found in the establishment of industries using alcohol as their raw material. In the absence of any proved deposits of crude petroleum of any significant magnitude, alcohol, along with coal distillation products, is the most readily available raw material for starting an organic chemical industry in the country. In due course, the establishment of industries consuming alcohol will make it less necessary to find an outlet for it as motor fuel. A few such schemes are already envisaged under the Second Plan. Some of the major schemes which are expected to require substantial quantities of alcohol are the DDT project in Travancore-Cochin, the expansion of the DDT factory in Delhi, the expansion of the plant for the manufacture of the acetate variety of rayon at Sirpur-Kagaznagar and the schemes of the Imperial Chemical Industries and the National Carbon Co. for the manufacture of polyethylene. Two schemes for the manufacture of ethylene dichloride have also been licensed. The expansion contemplated for the drug and pharmaceutical and dyestuff industries will also contribute to an increased demand for industrial alcohol. Another major scheme which may ultimately create a large demand for alcohol is the manufacture of polystyrene. Although, to begin with, the programme is based on imported monomer, when the production of styrene is finally undertaken in the country, large quantities of alcohol will be required for its manufacture. A proposal for the manufacture of synthetic rubber using alcohol as the basic raw material is also under consideration. When all these projects are implemented the demand for industrial alcohol is likely to go up by 16 to 17 million gallons per annum. It is, however, difficult to state the likely time schedule of some of these projects. In the circumstances a provisional target of 12 million gallons of industrial alcohol is envisaged for the Second Plan. If the demand develops at a faster rate, the additional requirements of industrial alcohol could be met by a diversion of power alcohol for industrial uses to the required extent. Further expansion of the industry may be contemplated during the latter half of the Plan period, depending upon the actual growth of demand for industrial alcohol.

Targets of capacity and production.—Based on the anticipated requirements during the Second Plan period, a combined production of 30 million gallons of power and industrial alcohol is envisaged to be achieved by 1960-61. Taking into consideration the inherent difficulties involved in the operation of alcohol factories to full capacity and on a continuous basis owing to the seasonal character of the supplies of molasses and the unhappy location of some of the existing factories the above production can be achieved, if a somewhat higher capacity is installed. A combined capacity of 36 million gallons per annum by 1960-61 is, therefore, suggested for both power and industrial alcohol.

Schemes licensed and under implementation.—A number of schemes which will increase the capacity of the industry have been licensed or recommended for licence under the Industries (Development and Regulation) Act. These schemes have been permitted on the basis of supplies of molasses being available from existing or projected sugar factories in these areas and of there being demand for alcohol in these regions. Details of these are given below:—

Name of the firm	Nature of scheme	Present annual capacity	Annual capacity when the scheme is completed
Central Distillery & Chemical Works, Meerut, U. P.	Expansion	(i) 540,000 gallons of power alcohol. (ii) 120,000 gallons of industrial alcohol.	(i) 1,320,000 gallons of total alcohol.

Name of the firm	Nature of scheme	Present annual capacity	Annual capacity when the scheme is completed.
Upper Doab Sugar Mills, U. P.	Expansion and shifting from Shamli to Pilkhani.	(i) 600,000 gallons of power alcohol (ii) 60,000 gallons of industrial alcohol.	1,000,000 gallons of total alcohol.
Shri Rama Sugar & Industries, Bobbli, Madras.	New unit	..	300,000 gallons of rectified and denatured spirit.
New Swadeshi Sugar Mills, Bihar .	New unit	..	960,000 gallons of power and industrial alcohol.
Narang Industries, Nawabgunj, U. P.	Expansion	(i) 600,000 gallons of power alcohol. (ii) 60,000 gallons of industrial alcohol	(i) 1,080,000 gallons of power alcohol. (ii) 240,000 gallons of industrial alcohol.
Shadilal Sugar and General Mills, Mansurpur, U. P.	Expansion	.	720,000 gallons of power alcohol.
Ajudhia Distillery, U. P.	Expansion	(i) 600,000 gallons of power alcohol. (ii) 90,000 gallons of weaker spirit.	(i) 960,000 gallons of power alcohol. (ii) 240,000 gallons of weaker spirit.
Rampur Distillery & Chemical Co., Rampur, U. P.	Expansion	750,000 gallons of total alcohol.	1,080,000 gallons of total alcohol.
Vizagapatam Sugar & Refinery, Andhra	Expansion	144,000 gallons of industrial alcohol.	600,000 gallons of industrial alcohol.
Mysore Sugar Co., Bangalore .	Expansion	(i) 540,000 gallons of power alcohol (ii) 540,000 gallons of industrial alcohol.	1,200,000 less gallons total alcohol.
Upper Ganges Sugar Mills, Seohara, U. P.	New unit	..	1,080,000 gallons of power alcohol.

In addition to the above it is proposed to set up a distillery in Madhya Bharat for which provision has been made in the State Plan. The distillery will have an annual capacity of about 600,000 gallons of power and industrial alcohol.

With the implementation of the schemes mentioned above, the annual capacity of the industry for power alcohol will increase from 14·9 million gallons to about 20·0 million gallons and for industrial alcohol from 12·2 million gallons to about 14·0 million gallons.

Additional capacity required.—As against a capacity target of 36 million gallons for both power and industrial alcohol by 1960-61 the installed capacity of the industry is expected to increase to about 34 million gallons per annum when all the schemes which are licensed or recommended for licence so far have been completed. A further increase in the capacity by about two million gallons will, therefore, be necessary to achieve the target of 36 million gallons per annum by 1960-61. The licensing of additional units has to be closely co-ordinated with programmes of development for the sugar industry and the demand for alcohol in different regions.

Investment and employment.—It is estimated that a sum of about Rs. 1 crore will have to be invested during the Second Plan to achieve the capacity target of 36 million gallons of power and industrial alcohol. This is exclusive of the outlay on the modernisation and improvement of existing units.

It is estimated that about 2,000 additional persons will be employed in this industry in the Second Plan.

Requirements of raw materials.—The most important raw material required by the industry is molasses, although small quantities of alcohol are also produced from *mahua* flowers. The availability of molasses at a reasonable price and in adequate quantities is, therefore, of considerable importance for the location and economic operation of power alcohol distilleries. From the locational point of view, the distilleries set up in Uttar Pradesh enjoy considerable advantage on account of their proximity to sources of supply of molasses. On the other hand, factories in West Bengal and Bombay have been at a disadvantage since in their case molasses has to be transported over long distances leading to higher costs of production. This is true to some extent even in Bihar where the distilleries have to depend on sugar factories located over a wide area for supply of adequate quantities of molasses. During the Second Plan the capacity of the sugar industry is expected to be stepped up to 2·5 million tons and production to 2·25 million tons per annum. Up till the end of December 1955, 37 new sugar factories and 44 expansions had been licensed. With the establishment of these factories, it is expected that the difficulties experienced by power alcohol distilleries in some of the areas will, to some extent, be mitigated. The overall supplies of molasses in 1960-61 are expected to be about 900,000 tons inclusive of molasses from sugar factories and *Khandsari* manufacturers. The actual quantity likely to be available for alcohol production may, however, be reckoned at about 800,000 tons, which, if entirely used for this purpose will be sufficient to produce about 40 million gallons of alcohol. In addition about half a million gallons of alcohol can be produced from alternate raw materials like *mahua*, if supplies of the same can be arranged. As stated earlier, the factory proposed to be set up by the Madhya Bharat Government will be using *mahua* flowers to supplement the supplies of molasses. Thus, the anticipated total supplies of raw materials would be adequate to produce about 40 million gallons of alcohol and it should not be difficult to achieve the production target envisaged for 1960-61, provided care is exercised in siting distilleries at suitable locations in close proximity to supplies of molasses. It should even be possible to step up production beyond the targetted figure, in case demand justifies such a step.

Miscellaneous.—(i) For a steady growth of the power alcohol industry, it is desirable that the manufacturers should actively sponsor schemes for research into problems connected with the industry. Improvement in the economy of steam consumption and in the recovery of alcohol from molasses, disposal of the spent liquor after recovery of alcohol, recovery of yeast as a by-product for cattle-feed etc. are some of the problems which should be actively pursued by the manufacturers with assistance from the National Laboratories.

(ii) There is considerable scope for reducing coal consumption at some distilleries. While every effort is being made to ensure a steady and adequate supply of coal, the industry should make attempts to reduce its coal consumption in distilleries by modernizing plants so as to secure more economic production.

The following table summarises the development of the power alcohol industry envisaged during the period of the Second Plan:—

	1955-56		1960-61	
	Annual rated capacity	Production (estimated)	Annual rated capacity	Production
Power alcohol (million gallons)	14·9	10·4	36·0	18·0
Industrial alcohol (million gallons)	12·2	5·2		12·0

E. Textile Industries

40. COTTON TEXTILES

I. Review of Progress in the First Plan

Targets.—The programme of development formulated for the cotton textile industry in the First Plan envisaged a modest expansion of the industry, particularly in the spinning section, through the establishment of new units and expansion of existing uneconomic units. New units were expected to come into existence with a total installed capacity of about 350,000 spindles and, so far as possible, in undeveloped or underdeveloped centres in order to avoid further concentration of the industry in particular areas. The addition of these new units would raise the number of spindles from 10,942,241 (equivalent to 1,669 million lbs. of yarn) at the end of 1950-51 to 11,292,241 (equivalent to 1,722 million lbs. of yarn) in 1955-56. Furthermore the expansion of some of the 150 units of uneconomic size, that were in existence at the commencement of the Plan period, was expected to add another 50,000 spindles. A programme of fuller utilisation of the existing capacity both in the mill and handloom sectors of the industry was visualised in the Plan. The capacity was assessed on the basis of double shift operation for 305 days per annum in case of mills.

No expansion of loomage was envisaged beyond what would accrue from the completion of schemes which were already under implementation at the beginning of the Plan period. It was expected that these schemes would increase the number of looms from 194,411 (equivalent to 4,744 million yards of cloth) in 1950-51 to 195,849 looms (equivalent to 4,779 million yards of cloth) by 1955-56.

The Plan laid down targets of production for the yarn and mill cloth of 1,640 million lbs. and 4,700 million yards respectively to be achieved by 1955-56 as against the corresponding figures of 1,179 million lbs. and 3,718 million yards in 1950-51. In the case of handloom cloth the production target for 1955-56, was 1,700 million yards as against an estimated production of 742 million yards in 1950-51. The *per capita* consumption of cloth was expected to increase from 11·8 yards in 1950-51 to 15 yards in 1955-56. An export target was also set of 1,000 million yards per annum throughout the Plan period. Shortage of raw cotton was considered to be one of the important handicaps of the industry and the Agricultural Plan envisaged increased production of cotton from 2·971 million bales in 1950-51 to 4·229 million bales by 1955-56. This increase in production coupled with a partial changeover to medium and long staple varieties was expected to reduce the dependence of the industry on imports of foreign cotton. It was envisaged that about 3·7 million bales of domestic cotton would be consumed by the mill industry in 1955-56. Imports throughout the period of the Plan were expected to be of the order of 1·2 million bales per annum.

As against the targets laid down in the Plan the progress achieved by the industry during the five year period is indicated in the following paragraphs.

Capacity.—At the commencement of the Plan, there were 103 spinning mills and 275 composite mills with 10,942,241 spindles and 194,411 looms. The mill section of the textile industry has expanded as follows since April 1, 1951 :—

	Installed capacity	
	Number of spindles	Number of looms
As on April 1, 1951	10,942,241	194,411
,, ,, January 1, 1952	11,252,443	195,983
,, ,, ,, ,, 1953	11,422,863	197,711
,, ,, ,, ,, 1954	11,899,378	199,198
,, ,, ,, ,, 1955	11,957,637	202,714
,, ,, ,, ,, 1956	12,051,209	202,901

The industry was brought under statutory control under the Industries (Development and Regulation) Act, 1951, which came into effect from September 1952.

Up to December 1955 the Government had given licences for the establishment of 86 new mills with a spindleage of 1,085,524 and for the substantial expansion of 89 existing mills involving the installation of 952,806 spindles. In addition permission was given by the Textile Commissioner to 115 units to effect normal expansion involving the addition of 455,659 spindles. Thus up to the end of December 1955, a total of 2·49 million spindles had been sanctioned. Five new mills with a spindleage of 52,168 have already come into existence and five other new mills have installed a part of the spindles sanctioned, the number so far installed being 23,492. Similarly 16 mills have completed substantial expansions and installed 125,778 new spindles and 22 other mills have effected a part of their expansion and installed 116,004 spindles. 45 out of the 115 units permitted to effect normal expansions by the Textile Commissioner have completed the work and installed 142,476 spindles while 27 have effected a part of their expansion by the installation of 79,847 spindles. Thus a total of 539,765 new spindles have already been installed.

Two new mills licensed for 16,000 spindles did not take effective steps within the prescribed time and their licenses were revoked. In addition in the case of 4 mills licensed for 22,296 spindles the question of revocation of licences is under consideration.

Thus deducting the new spindleage already installed and the spindleage for which licences have been revoked or are likely to be revoked there are 1·91 million licensed spindles the installation of which is still pending.

In accordance with the recommendation made in the Plan, proposals for installation of additional looms were not sanctioned except in cases where irrevocable commitments had been made earlier. The additional capacity thus brought into existence amounted to 8,300 looms during the period 1951-54. Since 1955 practically no additional looms have been permitted in the mills in the interest of the handloom industry.

Taking into account the new units and expansions in existing units effected during the Plan period, there were on January 1, 1956, 121 spinning mills and 291 composite mills with a spindleage of 12,051,209 and loomage of 202,901. The increase in the spindleage and loomage during the Plan period have thus been 1,108,968 and 8,490 respectively and are in excess of the targets envisaged in the Plan.

The increase achieved in excess of the targets is partly due to the expansions of some uneconomic units and the conversion of some of the purely spinning mills into composite mills on the basis of approval given for spindleage and loomage capacity under the post-war expansion schemes.

The geographical distribution of the mills at the beginning and end of the Plan period and the increases in the spindleage and loomage State-wise are shown in the following table.

Installed capacity of the cotton textile industry in various areas in India as on April 1, 1951 *and January* 1, 1956

Zone	April 1, 1951				January 1, 1956				Increase	
	Number of spinning mills	Number of composite mills	Spindleage	Loomage	Number of spinning mills	Number of composite mills	Spindleage	Loomage	Spindleage	Loomage
Ahmedabad City	4	63	1,923,168	42,041	4	63	2,036,408	41,642	113,240	(—)339
Bombay City	5	58	2,972,968	64,895	5	58	3,105,448	65,183	132,480	288
Rest of Bombay	11	38	1,243,524	23,580	12	38	1,257,244	23,488	13,720	(—)92
Saurashtra	2	8	151,792	3,032	1	9	169,480	3,637	17,688	605
Kutch	1	..	5,312	..	1	..	5,312	..	..	..
Madhya Bharat	2	14	414,738	10,660	1	15	436,410	10,971	21,672	311
Bhopal	..	1	15,004	400	..	1	14,876	400	(—)128	..
Ajmer	..	4	64,420	1,755	..	4	66,312	1,738	1,892	(—)17
Rajasthan	2	5	92,738	1,544	2	5	96,068	1,719	3,330	175
PEPSU	..	1	17,856	390	..	1	26,560	530	8,704	140
Punjab	1	2	40,584	665	2	2	52,572	853	11,988	188
Delhi	..	3	140,976	3,435	..	3	156,532	3,442	15,556	7
Uttar Pradesh	5	16	734,420	12,636	6	17	770,792	13,590	36,372	954
Bihar	..	2	29,520	746	..	2	28,468	745	(—)1,052	(—)1
West Bengal	3	15	386,838	7,486	10	17	507,429	9,115	120,591	1,629
Orissa	..	1	33,404	432	1	1	51,472	864	18,068	432
Madhya Pradesh	..	11	366,552	7,218	..	11	374,130	7,394	7,578	176
Hyderabad	..	6	116,762	2,559	..	6	158,080	3,164	41,318	605
Madras	59*	18*	1,862,557*	7,566*	59	26	2,212,264	8,523	410,087*	957
Mysore	3	5	219,416	2,655	2	7	243,436	3,097	24,020	442
Kerala	5	4	109,692	716	8	2	140,412	717	30,720	1
Andhra	N.A.				7	..	60,380	..		
Pondicherry	N.A.				..	3	81,124	2,089		
TOTAL	103	275	10,942,241	194,411	121	291	12,051,209	202,901	1,108,968	8,499

* Includes Andhra.

It may be seen that expansion in spindleage has taken place primarily in Madras and Andhra States (410,087 spindles), Ahmedabad City (113,240 spindles), Bombay City (132,480 spindles), the rest of Bombay (13,720 spindles), West Bengal (120,591 spindles), Uttar Pradesh (36,372 spindles) and Hyderabad (41,318 spindles). Loomage has increased mainly in Bombay City, Saurashtra, Madhya Bharat, Uttar Pradesh, West Bengal, Orissa, Hyderabad, Madras and Mysore.

Production.—The production of cloth and yarn during the period under review has been as follows:—

	Production of cloth (million yards)				Production of yarn (million lbs.)
	Mill-made	Handloom	Powerloom	Total	
1950	3,665	805	148	4,618	1,174
1951	4,076	850	157	5,083	1,304
1952	4,599	1,109	204	5,912	1,449
1953	4,879	1,200	221	6,300	1,505
1954	4,998	1,318	243	6,559	1,561
1955	5,094	1,480	273	6,847	1,630

The output of mill yarn and mill cloth showed a steady increase during the period. This has been achieved mainly by an intensive utilisation of the spindleage and loomage in existence. The Government's efforts to secure larger supplies of raw cotton and their equitable distribution, the steady improvement in internal demand and a satisfactory level of export demand were primarily responsible for the increase in output. The target of 4,700 million yards set for 1955-56 in the mill sector was exceeded even in 1953 during which year the production amounted to 4,879 million yards. The output of 5,094 million yards in 1955 in the mill sector is the highest so far recorded by the industry.

The output of mill yarn in 1955 was 1,630 million lbs; it is estimated that the production of yarn during 1955-56 was of the order of 1,640 million lbs. and the target set for yarn production in the Plan has been achieved.

In the handloom sector also production increased steadily; the output during 1955-56 is estimated to be about 1,500 million yards which falls short of the target of 1,700 million yards set in the Plan. The steady increase is attributable to the better supply of mill yarn, to the reservation of the production of certain varieties of cloth exclusively to the handloom sector and to certain restrictions laid down on the production of bordered *dhoties* by the mills. Output in the powerloom sector also showed a trend similar to that in the mill and handloom sectors.

Production and utilisation of yarn during 1954 *and* 1955.—During 1955, the production of yarn at spindle point amounted to 4,076,000 bales (of 400 lbs.); of this 2,885,000 bales were consumed in composite mills for weaving cloth and 29,000 bales were consumed for manufacturing hosiery and other articles. Deliveries for exports and miscellaneous purposes accounted for about 55,000 bales. The yarn available for consumption by handlooms, powerlooms and others amounted to 1,107,000 bales.

The figures for 1954 and 1955 are as under:—

	1954 ('000 bales of 400 lbs.)	1955 ('000 bales of 400 lbs.)
Production at spindle-point	3,902·6	4,076·0
Consumption:		
In composite mills for weaving cloth	2,864·7	2,885·2
For manufacturing hosiery and other articles	17·7	29·3
Delivered for export	11·9	53·0
Other purposes excluding export and civil consumption	1·5	1·6
Yarn available for consumption by handlooms, powerlooms and others	1,006·8	1,106·8

Control over production and distribution.—The period under review was marked by a systematic withdrawal of control over production and exports. Early in 1952, the mills were facing heavy accumulation of stocks and at one stage as many as 52 mills were temporarily closed down. It was found that under the control system a number of State nominees had been refusing to lift the stocks allotted to them. This situation necessitated a progressive relaxation of control measures and restrictions. In April 1952, permission was given to the mills to sell to buyers of their own choice, their entire production of fine and superfine cloth as well as 50 per cent of coarse and medium varieties. This margin was later on raised to 85 per cent. The State Governments were asked to issue licences freely to dealers and restrictions on inter-State movements were relaxed. In view of the increase in production and the large stocks available, with effect from October 1, 1952, the Government removed in stages the price control on most of the popular varieties of cloth. In July 1953 distribution and price controls on cloth were completely abolished; the only controls now remaining are certain measures of production control to measure the durability of the cloth produced by the mills and certain reservations in favour of the handloom industry.

The excise duty on cloth was kept constantly under review and was adjusted periodically with a view to enable the industry to tide over periods of slack demand.

Controls over the distribution of yarn were also liberalised. Mills were permitted to sell their entire output of yarn manufactured from foreign cotton and up to 33 1/3 per cent of yarn produced from Indian cotton to buyers of their own choice. This percentage was raised to 50 in September 1952. In July 1953, the control over price and distribution of yarn was abolished completely.

Imports and exports.—During the period under review small quantities of superior quality piecegoods were imported from the United Kingdom, Canada and Japan. Substantial quantities of sewing or darning thread were also imported from the United Kingdom and Italy.

The imports of cotton manufactures have been as follows:—

Year	White bleached (million yards)	Coloured, printed or dyed goods (million yards)	Sewing or darning thread ('000 lbs.)
1950-51	1·9	3·1	392
1951-52	1·4	6·1	1,343
1952-53	0·9	3·6	1,235
1953-54	2·3	2·8	733
1954-55	1·2	2·1	306
1955-56 (Ten months, April to January)	1·8	5·2	194

Imports of cloth were allowed only on a quota basis until September 1954. This restriction was removed with effect from September 11, 1954 and imports are now being allowed freely. The tariff duty operated as a sufficient safeguard for the indigenous industry. The tariff duty on certain types of imported cloth was reduced from 100 per cent to about 40 per cent *ad valorem* in May 1955 following representations from a textile delegation from the United Kingdom. This has so far had no undesirable consequences on the domestic industry while at the same time it has allowed certain special types of quality fabrics to come into the market.

The Plan visualised an export target of 1,000 million yards per annum during the period of the Plan. The actual exports were however below the target as shown below:—

Year	Handloom cloth (million yards)	Mill-made cloth (million yards)	Total cloth (million yards)	Twist and yarn (million lbs.)
1950-51	60	1,210	1,270	74·5
1951-52	40	384	424	6·2
1952-53	55	561	616	17·9
1953-54	65	703	768	22·2
1954-55	53	760	813	1·3
1955-56 (Ten months, April-January)	47	556	604	19·5

Various measures were taken by the Government during the period under review with a view to stimulating exports. Fine and superfine cloth were licensed freely for export with effect from April 1, 1952 and the same policy was applied to coarse and medium cloth with effect from May 19, 1952. Restrictions on the quantities which mills were permitted to pack for export were removed at the same time. In January 1953 the Government reduced the export duty on coarse and medium cloth from 25 per cent *ad valorem* to 10 per cent *ad valorem* in order to increase the competitive position of Indian cloth in overseas markets. The position did not improve materially and the Government abolished the 10 per cent export duty on medium cloth, only retaining the export duty on coarse cloth. This duty was again reduced to 6¼ per cent *ad valorem* from March 1, 1955. With the object of consolidating and promoting the export trade in mill-made cloth and yarn, the Government set up an Export Promotion Council in 1954. A delegation sponsored by the Council visited Burma, Thailand, Indonesia, Malaya, Singapore and Ceylon in 1955 and made detailed on-the-spot studies of the potentialities of these markets. The Council has introduced a scheme for inspection of textiles meant for export. The system of quality-marking introduced by the Council on a voluntary basis has not so far met with much success. The question of introducing more effective measures for ensuring quality standards is engaging the attention of the Government.

Yarn exports were initially allowed only to those countries with which India had trade agreements. The increase in the domestic production of yarn and lack of offtake following the depression in the handloom industry, necessitated liberalisation of the Government's export policy. Up to the end of 1952, exports of yarn were permitted on the basis of yarn packed and lying unsold up to particular dates. Since 1953, mills have been allowed export quotas calculated according to the "Free Yarn" made available by them to the handloom industry. This policy has met with appreciable success.

The bulk of Indian cloth exports consist of coarse and medium varieties produced out of cheap indigenous cotton and in this respect India at present has a positive advantage over the United Kingdom and Japan which have to obtain all their raw cotton from abroad. However, Indian coloured cloths are facing increasing competition from Japan in quality and price.

Consumption.—The *per capita* availability of cloth showed a progressive increase during the Plan period from about 9·7 yards in 1950 to 15·8 yards in 1955. The quantity of cloth available for civil requirements and the *per capita* availability has been as under:—

Year	Production (Million yards)	Imports (Million yards)	Exports (Million yards)	Defence and other purposes (Million yards)	Availability for civilian requirements (Million yards)	*Per capita* availability (yards)
1950	4,618	7	1,120	27	3,478	9·7
1951	5,083	9	823	31	4,238	11·7
1952	5,912	5	602	39	5,275	14·4
1953	6,300	5	716	22	5,566	15·0
1954	6,559	6	956	23	5,586	15·0
1955	6,847	6	873	29	5,951	15·8

The target of 15 yards *per capita* visualised in the Plan for 1955-56 was already achieved by 1953; and the target has been exceeded by a comfortable margin in 1955.

Raw cotton.—To meet the shortage of raw cotton and in order to reduce the industry's dependence on foreign countries for superior varieties of cotton, the Agricultural Plan set a target for producing an additional 1·26 million bales by 1955-56. The specific measures adopted for this purpose included provision of irrigation facilities to cotton lands, supply of improved varieties of seeds and fertilizers to cotton growing States. Extension staff for giving technical advice to cultivators and for propaganda work was also appointed. These measures have assisted considerably in increasing the output of raw cotton.

The area under raw cotton and the output have been as follows:—

Year	Area (Million acres)				Production of cotton lint (Lakh bales of 392 lbs.)			
	Long staple	Medium staple	Short staple	Total	Long staple	Medium staple	Short staple	Total
1950-51	3·4	7·6	3·6	14·6	6·8	14·5	8·4	29·7
1951-52	4·8	7·1	4·3	16·2	9·2	12·2	9·9	31·3
1952-53	5·2	6·5	4·0	15·7	9·0	13·7	8·7	31·3
1953-54	6·0	7·6	3·6	17·2	14·2	16·6	8·8	39·7
1954-55	6·3	8·2	3·8	18·3	15·9	18·9	8·3	43·0

The staple-wise breakdown clearly points to the fact that the increase in acreage and yield has mainly been in long staple varieties in respect of which the country is in short supply and has to depend upon imports to some extent. Since 1950-51, when the Cotton Development Programme was initiated, the production of long staple cotton has nearly doubled. The target of 4·2 million bales set for the production of raw cotton was exceeded in 1954-55, during which year the production was 4·3 million bales. Final estimates of production during 1955-56 are not available; it is however estimated that the production in 1955-56 is likely to be somewhat lower than the target of 4·2 million bales envisaged in the Plan.

While there is an overall shortage of raw cotton, the country has a surplus of short staple varieties. Exports of such varieties are therefore permitted subject to quota restrictions. On the other hand long staple varieties are imported, primarily from Kenya, Sudan, Egypt and the U. S. A. The figures of actual imports and exports of raw cotton are given below:—

Year	Imports '000 bales of 392 lbs.	Exports '000 bales of 392 lbs.
1950-51	1,228	84
1951-52	1,218	131
1952-53	791	405
1953-54	665	200
1954-55	691	171
1955-56, (Ten months, April—January.)	508	488

The estimated consumption of raw cotton during the Plan period has been as follows:—

Year	'000 bales of 392 lbs. net
1950	3,492
1951	3,846
1952	4,259
1953	4,483
1954	4,677
1955	4,884

As was to be expected, the consumption of raw cotton steadily increased year by year.

Competition from foreign countries.—There is a growing tendency on the part of the cotton growing countries to establish their own cotton textile industry. The weaving capacity of the textile industry in Brazil, Mexico, Argentina, Egypt, Greece, Turkey and Peru has steadily increased during recent years. Moreover the manufactures of such newly established mills are protected from foreign competition by means of high tariffs and other restrictive measures. Japan has re-emerged as an important cotton piecegoods exporting country and has been steadily expanding her market. A considerable proportion of the machinery installed in Japan's textile mills in the post-war period is new and automatic. This has enabled Japan to produce cloths capable of competing successfully in external markets both in price and quality. Pakistan has also been building up her cotton textile industry. Pakistan's textile mills have at present a rated capacity of 1·4 million spindles and 19,000 looms. Further Pakistan has good quality cotton in abundance. It is expected that Pakistan with her modern machinery and abundant raw cotton and cheap labour will not only be in a position to satisfy her domestic demand but also to export sizeable quantities of cloth in the near future. The place held by India among the principal cotton textile exporting countries during recent years is indicated in the following table:—

Country	Unit	1950	1951	1952	1953	1954	1955
United Kingdom	(Million square yards)	822	864	711	709	637	555
U. S. A.	,,	563	811	773	628	614	550
Japan	,,	1,104	1,066	762	914	1,278	1,130
Germany	,,	126	233	273	232	226	241
Italy	,,	354	371	170	144	98	103
India	(Million yards)	1,133	780	586	628	834	815

Modernisation of machinery.—The bulk of the machinery in use at the commencement of the First Plan had outlived its period of efficient and economical service. The Working Party appointed for the Textile Industry in 1950 recommended that high priority should be accorded to the rehabilitation of plant and equipment and remodelling some of the existing buildings of the industry. It further suggested that the process of rehabilitation and renovation would have to be spread over 10 or 15 years so as to avoid having to pay abnormal prices for plant and machinery and to regulate timely deliveries of the same. The Working Party pointed out that the reserves available with the industry were not commensurate with the requirements of such a large task and that the Government should assist the industry by advancing loans at 4 per cent interest. Considerable progress was made between 1951 and 1956 by the leading textile mills in modernising their plants.

A survey unit organised by the Government of India is at present engaged in getting factual data regarding the requirements of the mill industry for rehabilitation of equipment and machinery. The unit is also engaged in the investigation of the working of those units of the industry which are uneconomic and therefore are either already closed or facing closure. So far this unit has completed the surveys in respect of 25 mills. The National Industrial Development Corporation has been assigned the task of assisting financially the rehabilitation programmes for which the investigations conducted by this survey unit would provide the necessary data. A simultaneous investigation is also in progress regarding the rate at which replacements of machinery are required in order to help in planning the development programme of the textile machinery industry. The investigation has been completed in the case of 75 mills.

Capital investment.—According to the Census of Manufactures, the capital investment in the industry in 1950 amounted to about Rs. 203 crores comprising a fixed capital of Rs. 66 crores and Rs. 137 crores of working capital.

During the period under review, it is estimated that an amount of Rs. 20 crores has been spent on the installation of new units and the substantial expansion of others. Taking into account the value of cotton textile machinery imported and indigenously produced during the Plan period and the ancillary investments on land, buildings, electrical machinery etc., it is estimated that a total investment of Rs. 80 crores was made by the cotton textile industry on new units, expansions and modernisation during the period of the First Plan.

Labour.—The average number of workers employed in the industry during the period under review has been as under:—

Year	First shift	Second shift	Third shift	Total
1950	402,325	233,973	40,225	676,523
1951	415,602	249,962	48,915	714,479
1952	423,862	258,210	58,568	740,640
1953	421,888	258,372	63,724	743,984
1954	416,227	258,767	66,092	741,086
1955	419,236	262,225	76,582	758,043

The average daily number of workers in the second and third shifts has shown a steady increase during the Plan period. The average labour strength in 1955 is estimated at 7·6 lakhs.

Powerloom units which have been given TEXMARK numbers by the Textile Commissioner employ about 50,000 workers. The handloom industry provides employment to about 1·5 million workers (in terms of whole-time workers).

Textile research.—Under the guidance of the Cotton Textile Fund Committee, two new Research Associations *viz.*, the Bombay Textile Research Association and the South Indian Textile Research Association have been registered and a third one is to be started shortly. This will make a total of four Research Associations including the Ahmedabad Textile Industry Research Association.

Special enquiries into the industry.—(*i*) *Textile Enquiry Committee.*—A Committee was appointed by the Government of India in November, 1952 under the chairmanship of Shri Nityanand Kanungo (i) to conduct a comprehensive enquiry into the structure and organisation of the various sectors of the cotton textile industry, (ii) to study the nature and volume of the demand for cotton textiles internally as well as in the export market, (iii) to assess the extent to which each of the three sectors *viz.*, mills, handlooms and powerlooms may be utilised for the production of cotton textiles and (iv) to make an enquiry into all other matters incidental and ancillary thereto and make recommendations. The Committee submitted their recommendations to the Government in September 1954.

The Committee estimated the *per capita* consumption of cloth in 1960 at 18 yards and on this assumption and on the basis of a population of 400 millions, estimated that the domestic demand for cloth may amount to 7,200 million yards by that period. Requirements for export were estimated at 1,000 million yards. The total requirements of cloth on this basis were estimated at 8,200 million yards as against the current output of 6,600 million yards. By 1960, therefore, 1,600 million yards would be required over and above the present production. The Committee suggested that the whole of the extra production of 1,600 million yards should be secured through the decentralised sector of the industry *viz.*, the handlooms and powerlooms, and that there should be no expansion of the weaving section of the mill industry. The Committee suggested the pegging of mill cloth output at 5,000 million yards per annum. The Committee favoured the replacement of plain looms by automatic looms at the rate of 5,000 a year in the next 20 years.

The Committee proposed a phased programme for the conversion of 1.2 million active handlooms in the country into semi-automatic looms or powerlooms to make the handlooms technically more efficient. To begin with, the Committee suggested the conversion of 3 lakh handlooms into 60,000 powerlooms and 1.5 lakh improved semi-automatic looms over a six-year period, the conversion of the remaining looms being spread over two or three five-year periods so that the entire handloom industry would be transformed for operating on improved handloom or powerloom within 15 to 20 years. The Committee estimated that 1.75 million additional spindles would be required for producing the yarn required for the production of 1,600 additional million yards. The Committee also recommended that Government should register and license all handlooms.

(ii) *Karve Committee.*—While the Government were considering the recommendations of the Kanungo Committee, a Committee under the chairmanship of Prof. D. G. Karve was appointed by the Planning Commission which was *inter alia* asked to make recommendations regarding the development of small-scale industries in the Second Plan. In respect of cotton textiles, the Committee recommended that production of mills and powerlooms should be limited to the level already reached *viz.*, 5,000 million yards and 200 million yards respectively and that all the increased demand during the Second Plan period should be met by expansion of handloom production. The Committee suggested that there should be no conversion of handlooms into powerlooms but recommended the use of modern types of handlooms with fly shuttles. The Committee also recommended that the production of yarn required for the additional production of cloth during the Plan period should be organised on a decentralised basis to the greatest possible extent. It was accordingly suggested that licensing of new spindles should be deferred until May 1956 by which time the merits of the *Amber Charkha* a new type of *charkha* which is reported to be capable of producing a larger quantity of yarn than can be turned out by the ordinary *charkha*) would be known. The licensing of new spindles has accordingly been suspended.

Progress of the handloom industry.—According to a sample survey conducted by the Kanungo Committee, there are about 2 million handlooms in the country working on cotton yarn, of which about 450,000 are domestic handlooms in Assam. The effective number of commercial looms is therefore about 1.55 million of which only about 80 per cent or 1.25 million of the looms are active.

Prior to the period of the Plan, the industry's main handicap was lack of sufficient yarn. Appreciable supplies of free yarn made available during the Plan period coupled with liberal financial assistance rendered by the Government enabled the industry to increase its output progressively. The quantities of free yarn available and the estimated output of the handloom sector have been as follows:—

Year	Deliveries of free yarn bales per month	Output million yards
1951	51,767	850
1952	67,546	1,109
1953	73,101	1,200
1954	80,302	1,318
1955	88,567	1,480

With larger supplies of mill-made cloth available at lower prices and consequent upon certain other factors the handloom industry passed through a difficult period in the earlier years of the Plan and in 1952 stocks of handloom cloth began to accumulate. With a view to framing schemes for the development of the handloom industry the Government constituted in 1952 the All-India Handloom Board, replacing the Standing Handloom Committee. The schemes were to be financed from a Handloom Fund raised by a levy of a cess at the rate of 3 pies per yard on all mill-made cloth except cloth exported abroad. To give a fillip to the industry, certain varieties of cloth, including *sarees* using dyed yarn and *dhoties* with borders exceeding a certain width, *lungis*, *sarongs*, etc. were reserved for the handloom industry in 1950-51 and these reservations continue to be in force. In January 1953, the Government restricted production by mills of bordered *dhoties* to 60 per cent of the production during the year 1951-52 and this measure succeeded in bringing down the overall production of *dhoties* to the required extent. As difficulties were experienced in enforcing this measure, an additional excise duty on production of *dhoties* over and above this percentage was levied as an effective way of implementing the same.

Financial assistance of about Rs. 10 crores has already been provided by the Government out of the handloom cess fund for various schemes of development. The policy of the Government has been to organise the handloom industry on a co-operative basis. Special assistance was given by way of loans for the setting up of spinning mills by Handloom Weavers' Co-operatives. Two industrial co-operative handloom factories were started and these have been working successfully. A number of new industrial co-operatives have also been planned. These co-operatives procure and distribute yarn to the weavers and also market the finished products. Other assistance given to these co-operatives is the supply of improved technical apparatus such as fly shuttles, take-up-motion attachments, etc., and the establishment of common processing plants for dyeing, calendering and finishing. In order to co-ordinate the development of the internal market and provide for proper organisation of the industry, research and propaganda, a Central Marketing Organisation under the All-India Handloom Board was set up in 1953-54 with branches in important cities. An export marketing scheme was also introduced in 1953-54. For assisting inter-State marketing of handloom cloth, a handloom fabrics marketing co-operative society was established during 1955.

II. Programme of Development in the Second Plan

Estimated requirements.—The programme of development of the cotton textile industry in the Second Plan outlined below provides for an increase in the *per capita* consumption of cloth from 16 yards in 1955-56 to 18.4 yards in 1960-61 and an export of 1,000 million yards per annum under the Second Plan. This increase in *per capita* consumption would correspond to a 25 per cent increase in the total consumption of cloth from the present level of 6,000 million yards to 7,500 million yards in 1960-61 assuming a population of 408 millions in 1960-61. The output of cloth will, however, have to be stepped up further if on a closer assessment of the trends of demand it appears necessary to provide for a *per capita* consumption of about 20 yards of cloth in 1960-61 instead of only 18.4 yards.

Target capacity for yarn.—It is assumed for the present that the total requirements of cloth by 1960-61 including an export demand of 1,000 million yards will amount to 8,500 million yards. The yarn required for producing 8,500 million yards is estimated at 1,890 million lbs. Inclusive of exports and of the demands of the hosiery industry, *niwar* making and similar miscellaneous industries, the overall demand for yarn is estimated at about 1,950 million lbs. in 1960-61. Assuming that no additional output of yarn can be expected from the spindleage in existence at the end of 1955, *i.e.*, that the effective capacity of the industry at the commencement of the Plan on the basis of the average output during the period July-December, 1955 is 1,700 million lbs. of yarn, additional spindleage to give an extra output of 250 million lbs. of yarn should be available by 1960-61. This will correspond to 1.57 million spindles on the basis of double shift working for 305 days in the year. While at the end of December 1955, the number of spindles licensed but remaining to be installed was 1.91 millions, it is estimated that at the end of First Plan, the figure would come down to about 1.8 millions.

Out of 1.8 million spindles, the installation of which would be outstanding at the commencement of the Second Plan, it is estimated that about 1.4 millions will actually materialise This would leave a gap of 170,000 spindles to be installed for achieving the targetted output of yarn. It is considered that this capacity can be taken care of by normal expansions in the spindleage of the mills and by the modernisation programmes envisaged on a considerable scale during the Second Plan period, quite apart from some output of yarn likely to materialise from the schemes of development of the *Khadi* and other decentralised units. The installation of further spindleage might, however, have to be considered, if trends of demand indicate that provision should be made for a *per capita* consumption of more than 18.4 yards of cloth by 1960-61.

The establishment of 1.57 million spindles is estimated to involve a capital expenditure of about Rs. 30 crores.

Pattern of production of cloth.—Issues connected with the allocation of the overall production of cloth as between mills and the decentralised sector are still under consideration. For mill cloth a target of 5,000 or 5,500 million yards is tentatively proposed. This will mean that 3,500 or 3,000 million yards will have to be produced by the decentralised sector.

For achieving a production of 500 million yards of cloth in the mill sector exclusively for export, the Ministry of Commerce and Industry have suggested that about 20,000 additional looms would require to be installed during the Second Plan period. The matter is still under consideration and no final decisions have been taken so far. If it is decided after further consideration to allow the installation of new looms in the organised mill sector, it is suggested that preference should be given to expansion of existing textile mills which are of uneconomic size or the establishment of new mills in relatively backward areas.

Achievement of the production target by the handloom industry will involve a major organisational effort which will aim at bringing every available active handloom into use for the maximum number of days in a year and also at raising the output per loom by introducing technical improvements and offering to the weaver, the necessary incentives for larger production.

Raw cotton requirements.—The quantity of raw cotton required to produce the amount of yarn for 8,500 million yards of cloth will be about 6·1 million bales. A target of production of 5.5 million bales of raw cotton by 1960-61 is envisaged in the Agricultural Plan. About 7 lakh bales of superior cotton are being imported at present but these imports are likely to come down if the efforts to increase the production of long staple cotton envisaged in the Second Plan succeed.

The development programme of the cotton textile industry in the Second Plan is summarised in the following table:—

	1955-56	1960-61
Rated capacity of mill industry:		
Spindles (Numbers)	12,051,209	13,621,209
Yarn (Million lbs.)	1,840	2,080
Looms (Numbers)	202,901	202,901
Cloth (Million yards)	4,950	4,950
Production:		
Yarn (Million lbs.)	1,630	1,950
Mill cloth (Million yards)	5,094	5,000 to 5,500
Handloom & powerloom cloth (Million yards)	1,753	3,000 to 3,500
Exports:		
Cloth (Million yards)	873	1,000
Requirements of raw cotton (Million bales)	4·9	6.1

41. JUTE TEXTILES

I. Review of Progress in the First Plan

Targets.—The programme of development formulated for the jute textile industry in the First Plan did not include any plans for the establishment of new mills or the expansion of existing units, in view of the shortage of raw jute and the existence of unused capacity in the mills. The objective laid down in the Plan was to utilise more fully the available capacity of 1·2 million tons by provision of larger supplies of raw jute and thereby to increase the production of jute manufactures from 892,000 tons in 1950-51 to 1·2 million tons by 1955-56. Since the industry caters primarily for foreign markets, a target for exports of jute manufactures was also laid down in the Plan. It was visualised that it would be possible to increase exports from 650,000 tons in 1950-51 to one million tons by 1955-56.

Shortage of raw jute was obviously a serious factor tending to make the industry unstable and it was considered that in order to place the industry on a more secure basis, it was necessary to reduce dependence on imported supplies of raw jute. The Plan for the cultivation of jute in the country envisaged an increase from about 3·3 million bales in 1950-51 to about 5·1 million bales by 1955-56. In addition, it was visualised that supplies of *Bimli* and *Mesta* would supplement the jute supply by about one million bales in 1955-56.

As against the targets visualised in the Plan, the levels of production and export of jute manufactures and of cultivation of raw jute estimated to have been reached by the end of the Plan period are indicated in the following paragraphs.

Capacity and production.—In 1950, there were 112 registered jute mills in the country—101 in West Bengal concentrated near Calcutta, 4 in Madras (Andhra area), 3 in Bihar, 3 in Uttar Pradesh and 1 in Madhya Pradesh. The total loomage of these mills in that year was 72,572 (as against 72,288 in 1955) comprising 45 per cent hessian and 55 per cent sacking. The total capacity of these mills has been estimated to be 100,000 tons per month (on the basis of a single shift and a 48 hour week).

During the period under review there was hardly any addition to capacity by the establishment of new units or expansions. One new unit for the establishment of which effective steps had already been taken before the enforcement of the Industries (Development and Regulation) Act, 1951, was registered under this Act. Another new unit—the Assam Jute Mills, Gauhati, with a capacity of 300 looms was licensed as a special case at the instance of the Government of Assam. This unit is expected to be set up during the initial stages of the Second Plan.

The quantity of jute manufactures produced since 1950 has been as follows :

('000 tons)

Year	I J M A Mills				All-India total
	Hessian	Sacking	Other Manufactures	Total	
1950	317	485	34	836	870
1951	322	521	32	875	909
1952	311	607	34	952	985
1953	389	450	30	870	924
1954	389	506	32	928	1,010
1955	401	575	51	1,027	1,095

As compared to 1950, production of jute manufactures increased in 1951 and 1952 aided by an increase in the domestic supplies of raw jute. Production declined in 1953 owing to a slackening in the export demand both because of increased competition from Continental mills and because of stocks built up during the Korean War. The output improved again in 1954 on account of better supplies of raw jute and improvement in export demand. Production has risen a little further in 1955 to 1·095 million tons. Though export demand was slack in the early part of the year, it improved later on and supplies of raw jute were also easier. The output of jute manufactures in 1955-56 is estimated to be about 1·15 million tons as against 1·2 million tons targetted in the Plan.

Control over production of sub-standard goods.—The Government of India issued in February 1956, an order to control the production of jute textiles. The order provided that only units with licences obtained from the Jute Controller would be allowed to operate. The order seeks to eliminate the growth of small power-driven establishments not coming within the purview of the Industries (Development and Regulation) Act, 1951, which are being set up by speculative elements to take advantage of the recent rise in prices. These establishments have been acquiring discarded machinery and producing sub-standard goods which are bound to injure the long-term interests of the industry.

Exports of jute manufactures.—The quantity and value of the jute manufactures exported since 1950-51 were as follows :—

	Quantity	Value
	('000 tons)	(Rs. crores)
1950-51	650	114
1951-52	805	270
1952-53	705	129
1953-54	778	114
1954-55	853	124
1955-56	875	120

During 1951-52 exports of different types of jute manufactures were encouragingly high, particularly exports to the U.S.A. The consumption of burlap in the U .S.A.registered a considerable increase during the year. There was, however, a setback in exports in 1952-53 following the end of the Korean war boom and the switchover to a buyers' market all the world over. Even though the decline in the physical volume of exports was comparatively small, there was a steep fall in their value owing to a sudden drop in prices. With a view to prevent accumulation of stocks, the working hours of the member mills of the Indian Jute Mills Association were reduced from 48 to 42½ as from April 1952. There was a slight recovery in the export demand in 1953-54 and in 1954-55 there was a substantial rise which was met by restoring the working hours of the mills in two stages. During April to September 1955, export demand was slack but it revived after October 1955. To meet the increase in export demand, the Indian Jute Mills Association decided to unseal in two stages 7½ per cent out of the 12½ per cent sealed capacity so as to enhance production by 75,000 tons.

Exports of jute manufactures during 1955-56 have been 875,000 tons valued at about Rs. 120 crores. The quantity exported during 1955-56 was the highest during the Plan period ; however, this has fallen short of the export target of 1 million tons by 1955-56 envisaged in the Plan.

Competition from substitutes.—The industry has to face competition in the open market from the paper bag industry which is equipped with the most modern machinery and also from cloth bags. Bulk handling of goods particularly in the U.S.A. is also affecting the demand to some extent. The stability of paper prices as contrasted to the violent fluctuations in those of jute and cotton sacking has partly helped the growth of paper substitutes.

Export promotion measures.—(*i*) *Review of export duties.*—The Government adopted various measures during the Plan period with a view to assisting the industry. Export duties were constantly kept under review and were progressively reduced from time to time and finally abolished, taking into account the level of production, world demand and competition from foreign countries and in particular from Pakistan. Export duties on jute manufactures were reduced and export restrictions were relaxed in 1951-52. They were further brought down in May 1952 and February 1953. Duties on jute specialities and miscellaneous jute manufactures were abolished in July 1953 and those on hessian in September 1953. In August 1955, immediately after Pakistan's devaluation of her rupee, export duties were completely abolished to offset the advantage gained by the Pakistan jute manufacturing industry as a result of devaluation. The export duties per ton on hessian and sacking since 1950-51 have been as follows :—

	Hessian	Sacks
	Rs.	Rs
March 30, 1951	1,500	350
February 18, 1952	750	350
May 6, 1952	275	175
February 27, 1953	275	80
September 15, 1953	120	80
August 2, 1955	..	..

(*ii*) *Propaganda efforts.*—The Plan had recommended that efforts should be made to popularise jute goods in foreign markets through propaganda. Considerable efforts are being made by the Indian Jute Mills Association in this regard. The goodwill mission organised by the Association visited the United States, the U.K., Canada, Australia and New Zealand during the period under review. There is evidence that this propaganda effort was very useful in maintaining the position of jute goods in the U.S. markets. Propaganda campaigns were organised in New Zealand and Australia also. Another commendable effort of the Indian Jute Mills Association has been the investigation of the possibility of developing new uses for jute fabrics both by themselves and in combination with other materials. These efforts, though they have not yet brought any tangible results, are steps in the right direction, for in view of the increase in the production of conventional jute goods in other countries, it is very necessary that the indigenous jute industry should look for new products in order to help maintain its position. Some mills have themselves introduced quality control to help the industry to hold its own in an increasingly competitive market.

(*iii*) *Trade agreements.*—During the Plan period India entered into trade agreements with a number of countries for the supply of jute goods and this assisted considerably in promoting exports. Among the important countries with which trade agreements have been signed are China, U.S.S.R., Poland, Czechoslovakia, Hungary, Italy and Norway.

Raw materials.—(*i*) *Raw jute.*—It was recommended in the Plan that the supply of raw jute to the mills should be secured through increasing the indigenous production of raw jute and improving its quality and by taking steps to ensure regular imports of raw jute from Pakistan. This has more or less been achieved during the Plan period.

Of the raw jute producing areas, only about 25 per cent remained in Indian territory after partition and of the jute produced in India, only about one-fourth was of sufficiently good quality to be used by the mills. The devaluation of the Indian rupee in September 1949, created a major crisis for the industry on account of the change in the exchange rate with Pakistan; moreover the Pakistan Government fixed minimum prices for raw jute and purchased part of the crop to maintain these prices. To meet the situation, the Central Government fixed maximum prices of raw jute in consultation with the Indian Jute Mills Association, took steps to ration the availble supplies to various mills and imposed severe restrictions on the export of raw jute. Steps were also taken to expand the production of raw jute through reclamation of waste land, diversion of some paddy-growing areas to jute, double cropping of some areas, use of fertilizers and adoption of plant protection measures. In accordance with the recommendations made by the Expert Committee on the quality of raw jute, which were endorsed by the Jute Enquiry Commission, increasing attention is now being paid to improving the quality of the raw jute grown in India. Progress has, however, been rather slow. A survey of areas suitable for the cultivation of good quality jute has been carried out in Assam, but there has been considerable delay in implementing proposals for setting up seed multiplication farms in Bihar and Orissa and a nucleus seed multiplication farm under the control of the Indian Central Jute Committee. Only the seed multiplication farm in Bihar has been set up so far. The other schemes are expected to materialise during the Second Plan period.

During the period under review attempts were made to secure part of the requirements from Pakistan through trade agreements as follows :—

Year	Quantity provided for imports into India (lakh bales)	Period
1950	8	April-July, 1950
1951	10	March-June, 1951
1952	25	July 1951 to June 1952
1953	18	Three years July 1953 to June 1956
1955	18	One year agreement effective from 1-9-1955.

The table below gives data for the last six years regarding the cultivation of jute and *mesta* and the imports of raw jute.

Year	Raw jute		*Mesta*		Imports of raw jute from Pakistan	
	Area ('000 acres)	Yield ('000 bales)	Area ('000 acres)	Yield ('000 bales)	('000 bales)	(Rs. lakhs)
1950–51	1,454	3,302			2,496	27,49
1951–52	1,951	4,678			2,378	67,07
1952–53	1,820	4,605	369	560	1,325	16,48
1953–54	1,196	3,129	468	656	1,377	14,32
1954–55	1,243*	2,928*	571	1,106	1,223	13,00
1955–56†	1,581	4,137	579	1,159	1,176‡	14,78‡

*Revised. †Estimate. ‡April 1955—January 1956.

The stimulus of very high prices and the Government's efforts to encourage the production of raw jute combined to expand the cultivation of jute in 1951-52 to 1·951 million acres yielding 46·78 lakh bales as against 1·454 million acres yielding 33·02 lakh bales in 1950-51. Imports of raw jute were slightly lower in 1951-52 as compared to 1950-51 but their value recorded a remarkable increase on account of the Korean war boom. The area under cultivation as well as yield were lower in 1952-53 on account of a sharp decline in the prices of raw jute. Imports of raw jute further declined in 1952-53 as a result a fall in demand from the jute mills following a drop in export demand. The acreage and yield of raw jute fell sharply in 1953-54 on account of unfavourable weather conditions, the low prices of jute and the flood havoc in West Bengal and Uttar Pradesh. There was a further slight decline in the output of raw jute in 1954-55 but a recovery in 1955-56. The final estimate of production of raw jute in India during this year is 4·14 million bales which falls short of the target of 5·1 million bales envisaged in the Plan.

The area under cultivation and the yield of raw jute in the different jute-growing States during 1950-51 and 1955-56 were as under:—

State	1950-51		1955-56 (Estimated)	
	Area ('000 acres)	Yield ('000 bales)	Area ('000 acres)	Yield ('000 bales)
Assam	292	809	367	1,212
Bihar	358	658	270	588
Orissa	110	242	111	245
Uttar Pradesh	24	49	33	86
West Bengal.	651	1,496	780	1,958
Tripura	19	48	20	48
TOTAL	1,454	3,302	1,581	4,137

(*ii*) *Mesta.*—The area and yield of *mesta* have steadily increased during the period under review. The estimated yield of 1·16 million bales of *mesta* in 1955-56 has exceeded the target of 1 million bales envisaged in the First Plan.

Modernisation of equipment.—The existing machinery in the industry is to a large extent, worn out and obsolete with the result that production is inherently uneconomic and cannot be sustained for long without modernisation. In most of the Continental countries rapid re-equipment of the jute industry has taken place and this has given them an advantage over India in regard to labour and operating costs in that a considerable proportion of the preparing and spinning machinery is now of the most modern and labour-saving type. Even though the capacity of these mills has not been increased to any significant extent and there are so far as is known, few plans to establish new mills or expand the output of existing units, the modernisation and rationalisation measures have enabled the products of these mills to compete successfully with Indian goods. Pakistan, with new mills coupled with the availability of high quality jute, most modern machinery and relatively cheap labour is expected to offer stiff competition in foreign markets. As yet Pakistan's production and export of jute manufactures have not reached sufficiently high levels to affect the Indian industry materially, but competition from Pakistan is likely to become formidable in due course. Pakistan has at present 7,000 looms with a total capacity of 2 lakh tons per annum. Small local units are also being set up in a number of countries *viz.*, Egypt, Iraq, Iran, Burma, Thailand, Philippines and China which will all cut into India's exports to some extent. Japan has appeared as a new competitor in the field since 1953 and has been selling high quality jute goods at comparatively very low prices in the United States.

The number of looms in jute mills in all countries of the World in 1955 was as follows :—

Country		Number of looms	Percentage of World's total
1. India		72,288	53·0
2. United Kingdom		11,151	8·2
3. France		8,700	6·4
4. Germany (East 200) (West 4,800)		5,000	3·7
5. Brazil		4,987	3·7
6. Belgium		3,710	2·7
7. Italy		5,000	3·7
8. U.S.A.		4,000	3·0
9. Czechoslovakia		2,000	1·4
10. Poland		1,600	1·2
11. U.S.S.R.		1,315	1·0
12. Pakistan		7,000	4·9
13. Japan		1,000	0·7
14. South America (excluding Brazil)		1,000	0·7
15. Spain		4,000	3·0
16. China		1,317	1·0
17 Austria	500	2,319	1·7
18. Yugoslavia	300		
19. Sweden	362		
20. Estonia	230		
21. Norway	199		
22. Nepal	337		
23. Iran	142		
24. French Morocco	120		
25. Bulgaria	100		
26. Finland	29		
TOTAL		136,387	100·0

With a view to attaining a level of competitive efficiency so as to retain the foreign markets on which the industry is primarily dependent, the Indian mills also embarked upon schemes of modernisation in the post-war period. Modernisation as carried out does not increase the productive capacity of the industry which ultimately depends on the number of looms ; but it will enable the mills to supply their looms with yarn more economically by operating on modern high speed machinery and running it on a double shift.

Considerable progress has been made with the modernisation of preparing and spinning machinery. The modern machinery installed will supply approximately 21,000 looms with sliver spun yarn, out of a total of 63,313 hessian and sacking looms belonging to members of the Indian Jute Mills Association. This has cost approximately Rs. 15 crores in the Plan period. The progress can be considered satisfactory in view of the size of the industry, the number of units involved, the limitation in the capacity of machinery manufacturers, the general period of crisis through which the industry has been passing and the cautious policy adopted by the Government to ensure that modernisation causes no retrenchment of labour and that the reduction in labour strength is confined to normal wastage. Government have been very anxious to speed up the modernisation of the industry and apart from the general income-tax rebate of 25 per cent, the Government have been facilitating imports of jute mill machinery from the United Kingdom.

Capital and labour.—According to the Census of Manufactures the total capital investment in the industry in 1950 amounted to Rs. 67 crores comprising fixed capital of Rs. 30 crores and working capital of Rs. 37 crores. The capital investment in 1953, the latest year for which information is available, is as follows :—

	(Rs. lakhs)
Land	2,89·8
Buildings	10,08·1
Plant and machinery	15,47·7
Other fixed assets	1,25·2
Total fixed capital	29,70·8
Total working capital	37,15·3
Total productive capital	66,86·0

There was no capital investment of any appreciable magnitude during the period under review on new units or expansions of existing units, but it is estimated that about Rs. 15 crores will have been invested during the Plan period on modernisation and renovation schemes carried out in a number of mills.

The average labour strength of the jute mills covered by the Census of Manufactures was about 306,000 in 1950, 287,000 in 1951, 291,000 in 1952 and 272,000 in 1953. It is estimated that the present strength of workers in the industry is of the order of 270,000.

Jute Enquiry Commission.—A Commission was appointed by the Government of India in 1953 to make a comprehensive enquiry into the factors affecting the production and marketing of raw jute and jute goods, and the nature and effects of speculation in the trade, and to recommend measures for ensuring fair prices to the jute grower as well as the industry and for eliminating malpractices injurious to the long-term interests of the trade and industry. The Commission submitted their report in March 1954. The Commission's recommendations to the effect that the objective of the "grow more jute campaign" should be attainment of relative rather than absolute self-sufficiency and that the shift in emphasis should be towards intensive cultivation rather than cultivation on a widely dispersed basis were accepted by the Government. The Government also accepted the view of the Commission that export of raw jute, even as a measure of price support, should not be permitted. It was agreed that statutory price control would be undesirable for the industry which sells the bulk of its production in overseas markets and that the securing of a fair price for the grower is essentially a long-term problem which could be solved only by improving the scope of jute cultivation and the competitive strength of the industry. The Government also agreed that with so much idle capacity in the industry, the erection of new jute mills should not be permitted and that instead the objective should be to ensure the fuller utilisation of the existing capacity. The establishment of a well-regulated futures market, better transport and marketing facilities and other similar measures recommended by the Commission were agreed to in principle. Various other recommendations regarding intensive cultivation and improvement in quality enforcement of laws against usurious practices, setting up of regulated markets and warehouses and organisation of multi-purpose co-operatives to help the cultivators, were brought to the notice of the State Governments.

II. Programme of Development in the Second Plan

Estimated requirements.—Jute manufactures being mainly an export commodity the requirements of jute goods during the Second Plan period have to be assessed primarily on the basis of export demand.

During 1955-56, about 875,000 tons of jute goods were exported. In view of growing competition from foreign countries, the popularity gained by substitutes etc., no large-scale increase in the quantity of exports can at present be reasonably expected. Competition from Pakistan is likely to be more and more intense during the years to come. The Pakistan jute industry, which has at present about 7,000 modern looms, is expected to increase its loomage to 13,500 by 1960-61 and by working on double shift it will be able to double its production. Since the manufacturing capacity of all the mills (Indian and foreign) is already greatly in excess of world consumption, the extra output by the Pakistan mills is likely to have a depressing effect on the prices of manufactured goods out of all proportion to its quantitative importance, and this in turn is likely to have an adverse repurcussion on the industry as a whole. In the circumstances no appreciable increase in exports can reasonably be envisaged during the Second Plan period and an export target of 900,000 tons per annum may be envisaged. Export promotion measures will have to be continued to maintain this level of export demand.

The domestic requirements of jute goods is also expected to show some increase during the period of the Second Plan. The total export and domestic requirements by 1960-61 are expected to be of the order of 1·2 million tons.

Targets of capacity and production.—Since the requirements of jute goods are estimated at 1·2 million tons by 1960-61, production of the same order is envisaged by that year. The present capacity of 1·2 million tons per annum is considered to be adequate to produce the required quantity.

As mentioned earlier, the new mill of the Assam Jute Mills is expected to be set up during the initial stages of the Second Plan. Besides this, no additional units or expansions of existing units are envisaged in the Second Plan.

Raw jute.—The Plan for the cultivation of raw jute formulated by the Planning Commission envisages a target of 5 million bales by 1960-61, representing an increase of about 25 per cent over the estimated production of 4·1 million bales in 1955-56. As against this, the industry's normal requirements of jute are estimated at 7·2 million bales. The Plan does not, therefore, aim at self-sufficiency even by the end of the Second Plan period. Of the total of 5 million bales expected to be produced in 1960-61, West Bengal is expected to provide 2·3 million bales, Assam 1 million bales and the remaining jute growing States about 1·7 million bales. Emphasis will be laid on intensive cultivation. It is hoped to raise the yield of jute per acre from the present level of 2·5 bales to 3 bales. Special measures will also be taken for the improvement of the quality of raw jute. It is proposed to supply improved seed at concessional rates and devote greater attention to the arrangement for retting.

Investment.—An amount of Rs. 1·5 crores is expected to be expended on setting up the Assam Jute Mills. No further capital investment is envisaged as no new units or expansion of existing units are expected to be licensed during the Plan period.

Modernisation.—The modernisation of the equipment of about 42,000 looms, estimated to involve a financial outlay of about Rs. 30 crores is pending. The finances for the modernisation schemes have so far been met from the internal resources of the industry, but it may not be possible for the industry to maintain anything like the pace of progress of the past three or four years on account of lack of finance. It is expected, however, that the National Industrial Development Corporation will advance substantial loans to the mills so as to speed up the modernisation so necessary for maintaining competitive efficiency. This substantial assistance together with the internal resources of the industry will enable a major portion of the pending modernisation schemes to be completed by the end of the Plan period. In view of the limited supply of modern machinery and the need for the mills to implement modernisation schemes by stages in order to effect a smooth and gradual process of retrenchment and re-employment of labour, the expenditure on modernisation is likely to be spread out evenly over the period.

With a view to reducing dependence on foreign countries, and principally the United Kingdom, for jute textile machinery and also with a view to speeding up the process of modernisation by making available the required volume of machinery to the mills, the Government has recently licensed three firms, *viz.*, the Britannia Engineering Co., the Legan Jute Machinery Company and the Textile Machinery Corporation, for the manufacture of jute textile machinery. The Britannia Engineering Company has made considerable progress while the other two concerns are expected to go into production in the initial years of the Second Plan. With the commencement of full production of these units, the dependence of the industry on foreign countries for machinery is expected to diminish substantially.

The programme of development of the jute industry envisaged in the Second Plan is summarised in the following table :—

	1955-56	1960-61
Annual rated capacity (Thousand tons)	1,200	1,200
Production (Thousand tons)	1,150	1,200
Exports (Thousand tons)	875	900
Raw jute (Million bales)	4·1	5·0

42. RAYON AND STAPLE FIBRE

I. Review of Progress in the First Plan

Targets.—Art silk weaving had developed in a substantial way even before the First Plan. The requirements of rayon filament yarn were, however, met entirely by imports. The First Plan envisaged the development of the rayon industry so as to meet at least partially from indigenous sources the requirements of yarn for the art silk weaving industry. As against an average consumption of 37.7 million lbs. during the triennium 1948-49 to 1950-51, it was visualised that the demand for rayon filament for the weaving industry would go up to 50 million lbs. by 1955-56. This was considered adequate to produce 250 million yards of art silk cloth, including 10 million yards for export. Allowing for the requirements of miscellaneous industries at 5 million lbs., the consumption of rayon filament by 1955-56 was placed at 55 million lbs. The whole of this demand was not expected to be met from indigenous sources, but in view of the schemes that were in progress or under contemplation at the beginning of the Plan period, it was considered that by 1955-56, the installed capacity in the country for rayon filament might reach 22 million lbs. and actual production rise to the same figure as compared with 4.0 and 0.4 million lbs. respectively in 1950-51.

Rayon : Capacity and production.—At the commencement of the First Plan, the Travancore Rayons was the only factory producing rayon filament. This factory had a capacity of 4.0 million lbs. per annum. One more unit, that of the National Rayon Corporation (capacity 5.6 million lbs.) had just been completed. Both these factories had been equipped to produce the viscose variety of rayon. A third factory, that of the Sirsilk Ltd., with a capacity of 4 million lbs. was under construction. This plant was being set up by the Hyderabad State Government and was being planned to produce the acetate variety of filament. This was expected to go into production in 1953. It was further contemplated that the National Rayon Corporation would expand their capacity to 14 million lbs. by 1955-56. On the basis of these schemes, a capacity target of 22 million lbs. was visualised under the First Plan. It was further envisaged that the industry would operate at full capacity and so produce 22 million lbs. of rayon filament by 1955-56.

Progress on the cellulose acetate plant of the Sirsilk Ltd., did not keep to schedule owing to financial difficulties. The management of this factory was subsequently transferred to a private firm. The factory went into production only in June 1954. The Sirsilk Ltd. consumes part of its production within the factory itself for weaving rayon fabrics, the balance being available to the general weaving industry.

At the end of 1953, the annual capacity of the National Rayon Corporation stood at 7.2 million lbs. Both the National Rayon Corporation and the Travancore Rayons were granted licences in 1954 to expand their plants to a capacity of 12.0 million lbs. and 5.6 million lbs. respectively. The Travancore Rayons completed their expansion in December 1955. The expansion of the National Rayon Corporation is still in progress; part of the equipment has already been installed and as a result of improved technique of operation, it has been possible to increase the capacity of this plant to 12·7 million lbs. even before the completion of the full expansion programme and this is the figure at which it is estimated to stand at the end of the First Plan. The full programme will be completed only during the Second Plan. This firm has been further allowed to expand their capacity to about 19.5 million lbs. per annum.

As a result of these developments, the capacity target of 22 million lbs. has already been achieved and the position at the end of the First Plan is as follows :—

Name of the Factory	Capacity (Million lbs.)
National Rayon Corporation	12·7
Travancore Rayons	5·6
Sirsilk	4·0
TOTAL	22·3

The production of rayon filament has kept pace with the gradual expansion in capacity. The following table indicates the production in each year of the Plan.

Year	Viscose rayon (Million lbs.)	Acetate rayon (Million lbs.)	Total (Million lbs.)
1950-51	0·4	..	0·4
1951-52	6·0	..	6·0
1952-53	8·5	..	8·5
1953-54	10·1	..	10·1
1954-55	11·7	1·4	13·1
1955-56 (Ten months, April to January)	10·7	2·1	12·8

The estimated level of production in 1955-56 is by far short of the target of 22 million lbs. visualised in the Plan. This is because the expansion in capacity was somewhat delayed and has taken place only towards the end of the Plan with the result that full production could not be achieved in 1955-56. The industry has otherwise maintained a high level of production operating at near-full capacity.

Consumption.—As against an estimated demand of 55 million lbs. by 1955-56 visualised in the Plan, the actual quantities of rayon filament and yarn available for consumption during the Plan period have been estimated as follows :—

Year	Production	Imports*	Quantity available for consumption
	(Million lbs.)	(Million lbs.)	(Million lbs.)
1951-52	6·0	36·5	42·5
1952-53	8·5	22·2	30·7
1953-54	10·1	38·4	48·5
1954-55	13·1	40·7	53·8
1955-56 (Ten months, April to January)	12·8	42·4	55·2

*Do not include imports of art silk yarn mixed with other textiles or staple fibre.

The bulk of the imports came from the U.K., Germany, the Netherlands, France, Italy and Japan. Imports were restricted to actual requirements after taking into account the anticipated production of art silk cloth in any particular year. Small quantities of art silk yarn are allowed to be imported by established importers who cater for the needs of such small consumers as do not import the material themselves. The policy of restricting the imports of yarn largely to actual requirements has considerably assisted the development of the nascent industry. The average availability of rayon yarn during the last three years works out to about 55 million lbs. After allowing for about 5 million lbs. of yarn for miscellaneous uses, this provides nearly 50 million lbs. of rayon yarn to the weaving industry equivalent to a production of 250 million yards of cloth. The consumption of rayon yarn in the last year of the Plan has shown a substantial increase over the previous years and is estimated to have been about 60 million lbs.

Staple fibre : Capacity and production.—Before the First Plan, there was no indigenous capacity for staple fibre. The plant of the Gwalior Rayon Silk Mfg. (Weaving) Co., for the manufacture of staple fibre was in the very early stages of development at the beginning of the First Plan. This factory went into production in February 1954 with a capacity of 15 tons per day (11.2 million lbs. per annum) of staple fibre. The firm expanded the capacity to 18 tons per day in January 1955 and to 21 tons per day in December 1955. The present annual capacity is, therefore, about 16 million lbs. The actual production of staple fibre since 1953-54 has been as follows :—

	(Million lbs.)
1953-54	0·33
1954-55	9·81
1955-56 (Ten months, April to January)	10·97

Consumption.—Staple fibre is generally used as a substitute for long staple cotton and for spun rayon yarn used by the rayon weaving industry. The First Plan envisaged its consumption at 14.2 million lbs. in 1955-56. The actual quantity available for consumption during the Plan period is indicated below:—

Year	Production	Imports		Quantity available for consumption
		Staple fibre including waste	Staple fibre yarn	
	(Million lbs.)	(Million lbs.)	(Million lbs.)	(Million lbs.)
1951-52	..	36·5	3·7	40·2
1952-53	..	4·1	4·3	8·4
1953-54	0·3	27·3	1·9	29·5
1954-55	9.8	27·3	0.5	37·6
1955-56 (Ten months, April to January)	11·0	9·4	..	20.4

The consumption of staple fibre during the First Plan period averaged a little over 28 million lbs. per annum. The consumption in 1955-56 is estimated at about 30 million lbs.

The rayon and staple fibre industry has progressed considerably during the Plan period. The dull variety of viscose rayon yarn was produced for the first time in the country in 1955. The acetate variety of rayon yarn is also produced in both qualities, bright and dull. Titanium dioxide is required in the production of the dull variety of yarn and to begin with, imported titanium dioxide was used for this purpose. Recently it has, however, been possible to switch over to the use of indigenous titanium dioxide.

Notable progress has been made in the techniques of production. It has already been mentioned that the production capacity of certain plants has been stepped up without substantial addition to equipment by modification in the technique of operation. Efforts have also been made during the First Plan to fabricate some of the equipment required by the rayon industry. The National Rayon Corporation have successfully fabricated most of the parts of the bleaching and drying machines required for the expansion of their rayon plant. They also fabricated the bulk of the equipment for a sulphuric acid plant installed under their expansion scheme.

Investment.—The investment in the rayon industry during the period of the Plan is estimated at Rs. 7 crores. This is inclusive of investment in ancillary plants attached to the rayon units for the manufacture of sulphuric acid, carbon disulphide, etc. The required finance was partly raised by the issue of debentures and from institutional agencies like the Industrial Finance Corporation of India supplemented by internal resources of the operating companies.

Action on recommendations.—The First Plan laid considerable emphasis on the production of chemical pulp within the country to reduce dependence on imports for one of the important raw materials required by the rayon industry. The Plan recommended the establishment of a pulp plant of 100 tons per day capacity based on the soft timber resources available in the Himalayan region. It was suggested that the plant should be planned to produce 50 tons of mechanical pulp and 50 tons of chemical pulp, 15 tons of which might be used in admixture with the entire quantity of mechanical pulp for producing newsprint. The balance of 35 tons per day of chemical pulp was proposed to be made available to the rayon factories. The project was recommended to be taken up during the second part of the First Plan and was estimated to cost Rs. 6·0 crores.

It was not, however, possible to make much progress with this project on account of the difficulties involved in the extraction of the timber which is mostly located in inaccessible regions. The cost of felling and transport under the existing conditions, is considered to be prohibitive and no way has so far been found for the economic exploitation of these resources for the manufacture of wood pulp.

The Ministry of Commerce and Industry have recently constituted a Panel for drawing up programmes for the development of the paper and pulp industries. This Panel will *inter alia* make recommendations regarding the suitable raw materials for the production of pulp for the rayon industry. Apart from the possibility of developing a pulp industry based on the timber supplies available in the Himalayan region, investigations are proposed to be undertaken on the utilisation of the abundant supplies of bagasse for the manufacture of rayon grade pulp along with printing paper and newsprint. A team of German experts recently visited the country to explore this possibility and a project report is awaited. Certain other materials like eucalyptus and blue gum grown in the Nilgiri Districts of Madras State and wattle wood which is also grown in some quantities in Madras, are also suggested as possible raw materials for the manufacture of wood pulp. A team of experts from Italy, who recently visited the country, have been asked to work out detailed proposals based on the utilisation of these raw materials. It is expected that as a result of these investigations, one or two units with a total capacity of 30,000 tons of chemical pulp will be set up during the Second Plan. The investment on these plants is roughly reckoned at Rs. 8 crores. While the private sector may be associated with the establishment of these plants, the National Industrial Development Corporation is expected to take the initiative in this matter. The project is likely to be closely linked with the manufacture of newsprint.

The First Plan also recommended a co-ordinated programme of development for utilising cottonseed so as to produce at least 5·0 million lbs. of cotton linters and 7,500 tons of cottonseed oil. This was designed to obviate the need for importing the cotton linters required by the Sirsilk Ltd., in the production of acetate rayon. Production of cotton linters in the country has increased and at present the requirements of the Sirsilk are met substantially from indigenous sources. With the expansion of the Sirsilk the demand for cotton linters will increase further and it is desirable that during the Second Plan period, further efforts should be made to utilise cottonseed more intensively. The programme for the vegetable oil industry envisages the production of 30,000 tons of cottonseed oil which, if properly organised, should be able to produce simultaneously 20·0 million lbs. of cotton linters. Provided steps are taken to produce them in grades suitable for the acetate rayon industry, this would be more than adequate to meet the requirements of the Sirsilk after their expansion.

The First Plan did not recommend any addition to the capacity of the art silk weaving industry as the then existing capacity was considered adequate to produce 250 million yards of art silk cloth estimated to be required by 1955-56. The art silk weaving industry was brought within the scope of the Industries (Development and Regulation) Act, 1951, with effect from October 1, 1953. The capacity of the industry was re-assessed in June 1954 and it was estimated that at the end of 1953 there were 32,000 powerlooms and 72,000 handlooms operating on art silk yarn. In terms of cloth production, this corresponds approximately to a capacity of 300 million yards on the basis of single shift operation. The production in 1953 was estimated at 200 million yards consisting of about 180 million yards by the powerloom sector and about 20 to 30 million yards by the handloom sector. In spite of the surplus capacity in the industry, considerable imports of fine quality art silk fabrics, especially velvets, continued since the existing weaving facilities were not capable of producing the superior fabrics. It was, therefore, considered desirable to allow a modest expansion of the weaving industry for the manufacture of superior goods. As a result, expansions were permitted amounting to an addition of about 3,500 looms. The position was again reviewed in July 1955 and according to the estimate made at that time, the number of powerlooms working at the end of 1954 was placed at over 35,000. The production in 1954 was estimated at 229 million yards of art silk fabrics. Taking into consideration the additional looms licensed for the manufacture of superior varieties of fabrics, it was decided that no further increase in the installed loomage need be licensed for a period of six months. No licences have been given since July 1955.

Development Council for Art Silk Industry.—A Development Council for the art silk industry was set up in 1955. The Council has recommended that further expansion of the art silk weaving industry should not be permitted. Three sub-committees of the Council have been formed to study and report on:—

(i) suggestions regarding norms of efficiency with a view to eliminating waste, obtaining maximum production, improving qualities and reducing costs;

(ii) promotion of the adoption of measures for increasing the productivity of labour;

(iii) promotion of arrangements for better marketing and helping in the devising of a system of distribution and sale of the produce of the industry to the satisfaction of the consumer.

The Development Council has also made recommendations suggesting a target of 80 million lbs. for rayon yarn and 350 million yards of art silk cloth by 1960-61. The establishment of a Development Council for this industry is expected to assist in its rapid development during the Second Plan.

II. Programme of Development in the Second Plan

Estimated requirements.—(a) *Rayon*: The demand for rayon yarn during the Second Plan period has to be assessed in the light of the production envisaged for the art silk weaving industry. Account has also to be taken of the demand for rayon arising from other miscellaneous consumers. These are discussed below :

(*i*) *Art silk weaving industry.*— The Tariff Commission estimated the number of powerlooms engaged in the production of art silk fabrics in 1955 at 37,727 on the basis of information furnished by various art silk mills associations and others. The actual number of powerlooms registered with the Textile Commissioner's office on January 1, 1955 was 35,965. The industry is by and large concentrated in Bombay which accounts for over 28,000 of the powerlooms. Licences have been issued for the installation of over 3,500 powerlooms which will increase the total number of powerlooms to about 40,000. In addition, there are a number of handlooms producing art silk fabrics, mainly mixed fabrics. Their exact number is not known but has been variously placed at 75,000 to 150,000. The Tariff Commission in their Report on the Continuance of Protection to the Art Silk Weaving Industry, 1955, have adopted the latter figure. The Textile Commissioner has reckoned that on an average four handlooms can be considered as equivalent to one powerloom for purposes of assessing the capacity of the industry. The capacity of an average powerloom is considered to be 20 yards of cloth per shift. Thus the total capacity of the art silk weaving industry, including the handloom sector, reckoned at 150,000 handlooms, amounts to about 465 million yards on the basis of operation on a single shift and 300 days a year.

The actual production of art silk fabrics, however, has been much below this estimated capacity. The Tariff Commission has estimated that the average production during the three years 1951-53 was 245 million yards per annum inclusive of the output of the handloom sector reckoned on an average at 6 million yards. The average consumption of rayon yarn by the weaving industry during this period is estimated to have been 41 million lbs. per annum. The production of rayon fabrics according to the records maintained at the Textile Commissioner's office for more recent years beginning from 1953 is indicated below :—

Year	Quantity (Million yards)	Number of looms reported
1953	177·7	26,676
1954	179·9	25,965
1955	237·7	34,544

Allowing for the defaulting units which are not reported, and the production from the handloom sector the current level of production is estimated at 275 million yards. This corresponds to an annual rate of consumption of about 55 million lbs. of rayon yarn by the weaving industry. In addition, about 5 million lbs. of rayon yarn are normally utilised by the gas mantles and embroidery manufacturers, etc., so that the present consumption of rayon yarn is about 60 million lbs. per annum.

The Development Council have suggested a target of 350 million yards of art silk cloth to be achieved by 1960-61. This amounts to an increase of about 20 per cent in the present *per capita* consumption of art silk fabrics. The demand for art silk cloth is generally confined to the middle classes in urban areas but it is conceivable that in the absence of any restrictions the demand would show an upward trend of the magnitude envisaged by the Development Council. On the other hand, art silk fabrics can be regarded as luxury or semi-luxury articles and it is questionable whether full provision should necessarily be made for a vast expansion of their consumption. Unrestricted consumption of art silk fabrics may involve substantial imports of either art silk yarn or raw materials required for the production of art silk yarn, the dependence on imports being particularly great where the production of rayon is based on the viscose process. To what extent the limited resources available for industrial development can be permitted to go to the production of consumer goods of a semi-luxury nature like rayon fabrics which are in demand by only a small class of the population is discussed in later paragraphs.

Some quantities of art silk fabrics, particularly the finer varieties, are at present imported. The imports of art silk fabrics in recent years are shown in the table below. With the installation of the additional looms licensed for the production of these finer fabrics within the country, it is expected that that these imports will largely, if not entirely, cease during the Second Plan period. There has also been some export of art silk fabrics particularly to countries in the Far and Middle East. Exports have, however, substantially fallen as compared to the level in 1951-52 as is evident from the table. This is attributed to increased competition from other countries, especially Japan. An Export Promotion Council has recently been set up to advise Government on measures to stimulate the export of art silk fabrics. These steps are expected to give the necessary fillip to exports and an export target of 10 million yards is suggested by the end of the Second Plan. Variations in imports and exports, though important in themselves, are however, of little significance in evaluating the overall demand for art silk fabrics.

Imports and Exports of Art Fabrics

	Imports (Thousand yards)	Exports (Thousand yards)
1951-52	3,047	8,414
1952-53	1,153	3,621
1953-54	2,428	3,246
1954-55	4,118	3,493
1955-56 (Ten months, April to January)	8,623	2,468

In estimating the demand for rayon yarn, it is necessary to bear in mind the increasing popularity of various synthetic fibres like nylon in the manufacture of art silk fabrics. It is, however, doubtful whether consumption of these newer fabrics will increase to such an extent as to affect the demand for rayon yarn to any appreciable extent. For the purpose of estimating the demand for rayon, it may, therefore, be assumed that the entire quantity of art silk fabrics will be produced from it. On the basis of an average production of 5 yards per lb. of yarn, the requirements of rayon yarn for the production of 350 million yards of cloth suggested by the Development Council is estimated at 70 million lbs.

(*ii*) *Miscellaneous uses.*—The quantity of rayon yarn at present used for miscellaneous industries like the knitting, hosiery, gas mantle and embroidery industries, is estimated at 5 million lbs. No appreciable increase in this demand is expected.

An important consumer of rayon is the rubber tyre industry which needs rayon cord in substantial quantities. The requirements of this industry, which are of a special type, are at present entirely met by imports. In view of the special nature of this product, this has so far been left out in estimating the requirements of rayon. However, during the Second Plan period it is necessary to Plan for the production of this item. The present requirements of rayon for the rubber tyre industry are estimated at about 3·5 to 4 million lbs. Its actual consumption will necessarily depend upon the relative prices of rayon and cotton cord. It may, however, be roughly estimated that the demand for rayon by the tyre industry will increase to about 5 million lbs. by 1960-61.

Thus, the total demand for rayon, including those of the rubber tyre industry will amount to 80 million lbs., if provision is made for the production of 350 million yards of art silk cloth. This is the target for rayon yarn recommended by the Development Council.

(b) *Staple fibre.*—The estimated consumption of staple fibre yarn in 1955-56 is placed at 30 million lbs. It is difficult to estimate the likely demand during the Second Plan period with any degree of accuracy since this will ultimately depend on the supplies and relative prices of long staple cotton and rayon yarn at any particular period. However, on the basis of the present consumption and assuming the existing trends to continue, the demand for staple fibre by 1960-61 may be placed at about 35 to 40 million lbs.

Schemes licensed and under implementation.—Rayon : A number of schemes designed to increase the capacity of the industry have been licensed. When all these schemes are completed, the capacity of the rayon industry is expected to reach 68·3 million lbs. as shown below :—

	Capacity (Million lbs.)
1. National Rayon Corporation	19·5
2 Travancore Rayons	7·2
3. Sirsilk, Hyderabad	8·0
4. Century Rayons, Bombay	9·6
5. Sahu Jain, Calcutta	4·0
6. J. K. Commercial Corpn., Kanpur	4·0
7. Kesoram Cotton Mills, Calcutta	8·0
8. M. J. Vaidya	8·0
TOTAL	68·3

The first three schemes are in the nature of expansions of existing units. The remaining schemes are new units. All the above units excepting that of the Sirsilk are intended to produce the viscose type of rayon.

Staple fibre.—The only programme for the increased production of staple fibre is the expansion scheme of the Gwalior Rayon Manufacturing (Weaving) Company. With improved operation, its present capacity is reckoned at about 16 million lbs. This unit will double its existing capacity to about 32 million lbs. of staple fibre per annum on the basis of a programme under implementation.

Targets of capacity and production.—Rayon : As against the target of 80 million lbs. of rayon suggested by the Development Council, the capacity likely to be achieved on the basis of schemes so far approved, comes to a little over 68 million lbs.—60 million lbs. of viscose rayon and 8 million lbs. of acetate variety. Thus, the indigenous capacity falls short of the target suggested by the Development Council by about 12 million lbs. even after the completion of the schemes so far agreed to. In considering any further expansion in this industry, due account has to be taken of such factors as the dependence of the industry on imported raw materials, the capital-intensive character of the industry and the comparatively low priority it enjoys in the schemes of development envisaged during the Second Plan. While in the case of essential industries, development can be envisaged to the point of self-sufficiency, in the case of the rayon industry, which primarily caters to the requirements of a limited section of the population, it is doubtful whether a high priority can be attached to further expansion during the Second Plan and diversion thereto permitted of resources which might be better employed elsewhere. *Prima facie* such a course might be justified if it gave a stimulus to ancillary industrial development and the exploitation of raw materials available within the country, but not if it accentuates the strain on foreign exchange by requiring the import of raw materials. In the light of these considerations, it would seem that further expansion of capacity in the manufacture of rayon filament should be in terms of cellulose acetate filament, since the two primary raw materials, *viz.*, cotton linters and alcohol, are available within the country and its manufacture would give a stimulus to their production. Cellulose acetate filament production would also give an opportunity for a better dispersal of the rayon industry. In this connection, it is important that a study be made of the various factors which would contribute to the consumption of cellulose acetate filament on a substantial scale in the coming years. If, on a further study of this aspect by the Development Council for the Art Silk Industry, it is found impracticable to step up the consumption of cellulose acetate filament to a level of more than 8·0 million lbs. proposed to be developed by the Sirsilk, it might become necessary to allow further expansion of capacity for viscose rayon. The advantage of such a step has to be balanced against the strain on foreign exchange on account of imports of sulphur and chemical pulp that would be caused by it. The location of chemical pulp plant would have some influence on the location of viscose rayon plant, particularly if the latter is in proximity to consumption centres for rayon filament and it would, therefore, be desirable to defer consideration of schemes for further expansion of the rayon industry until the studies initiated by the NIDC lead to some positive conclusions on this subject.

In view of the several major issues pending consideration, the development programme envisages for the present a target of 68 million lbs. of rayon filament by 1960-61. It is, however, recommended that proposals for expansion of capacity of cellulose acetate filament should be considered on merits on account of the several advantages which its production secures to the national economy.

If the Development Council's estimate of the expansion of demand for art silk cloth during the next five years is correct, then, according to the programme envisaged above, it will not be possible to meet the entire requirements of rayon from indigenous sources. The extent to which imports of rayon could be permitted would depend on the exact level of demand and the foreign exchange resources available from time to time.

Staple fibre.—With the completion of the expansion programmes of the Gwalior Rayon Manufacturing Company the capacity for staple fibre will be 32 million lbs. as against an estimated demand of 40 million lbs. In the light of the fact that several of the considerations enumerated in the previous paragraphs apply equally to staple fibre, no further increase in capacity is envisaged during the Second Plan period. Both capacity and production are placed at 32 million lbs. by 1960-61.

Investment and employment.—The expansion required to achieve the targets discussed above is estimated to involve an investment outlay of about Rs. 24 crores during the Second Plan period and to provide employment to 4,500–5,000 additional persons.

Requirements of raw materials.—Depending on the type of process employed, different raw materials are used in the manufacture of rayon. The principal raw materials for the viscose process of rayon manufacture are chemical pulp, caustic soda and sulphur. In the acetate process, cotton linters, alcohol and caustic soda are required. The requirements of raw materials for the production of 60 million lbs. of viscose rayon, 8 million lbs. of acetate rayon and 32 million lbs. of staple fibre are estimated as follows :

Rayon grade pulp	47,200 tons.
Cotton linters	3,200 tons.
Alcohol	1·6 million gallons.
Caustic soda	42,000 tons.
Sulphur	34,000 tons.

In addition, it is estimated that about 2,900 tons of pulp, 2,500 tons of caustic soda and 2,100 tons of sulphur are required for the manufacture of transparent paper.

The entire requirements of pulp are at present met by imports; but, as mentioned earlier, it is envisaged that one or two units for the manufacture of chemical pulp will be set up at the most suitable locations during the Second Plan period, under the auspices of the National Industrial Development Corporation. This will, to some extent, reduce the dependence of the industry on imported pulp. The programme envisaged for cottonseed crushing takes into account the requirements of cotton linters by the rayon industry. In regard to caustic soda which has to be of a special grade for the rayon industry, the entire requirements are expected to be met from indigenous sources. Alcohol will also be available from domestic sources but sulphur will have to be imported.

Miscellaneous.—The bulk of the demand for rayon at present is from the weaving industry which requires yarn ranging from 75 to 200 deniers. Rayon of higher deniers is also consumed by the weaving industry to a small extent. The requirements of the rubber tyre industry is also for the higher deniers. The present production is confined within the range of 100 to 150 deniers. Since the existing capacity is far short of the requirements of rayon, there has been no special difficulty in the offtake of the indigenous product although its range is limited. The requirements for finer as well as coarser varieties of yarn are at present met by imports. Within the overall capacity target envisaged in the Second Plan, attention has to be paid to diversifying production to meet the demand for types not hitherto produced.

The tyre industry requires special types of rayon and its needs are at present entirely met by imports. The possibility of developing suitable types of rayon acceptable to the tyre industry has to be explored during the Second Plan period.

The capacity of the art silk weaving industry is far in excess of the anticipated requirements of art silk cloth. A moderate expansion of the weaving capacity for the manufacture of finer fabrics was permitted during the First Plan. It is considered that the industry is now in a position to meet all the varieties of art silk cloth expected to be in demand during the Second Plan period. No further expansion of the industry for art silk weaving is envisaged during the Second Plan.

The programme of development for the rayon and staple fibre industry envisaged for the Second Plan is summarised below :

	1955-56	1960-61
Annual capacity		
1. Rayon filament (Million lbs.)	22·3	68·3
2. Staple fibre (Million lbs.)	16·0	32·0
3. Chemical pulp (Tons)	..	30,000
Production		
1. Rayon (Million lbs.)	15·7	68·0
2. Staple fibre (Million lbs.)	13·2	32·0
3. Chemical pulp (Tons)	..	30,000
Exports		
1. Art silk cloth (Million yards)	2·5	10·0

43. WOOLLEN TEXTILES

The woollen textile industry consists of the organised mill sector, the cottage sector and the hosiery units. These are dealt with separately.

A. Organised Mill Sector

I. Review of Progress in the First Plan

Targets.—It was expected that the indigenous demand for woollen manufactures would increase to 23 million lbs. by 1955-56 from about 20 million lbs. at the commencement of the First Plan. It was visualised that the increase in demand could be satisfied if some of the mills worked double shift and the existing capacity was fully utilised and, therefore, the establishment of new weaving units during the period of the Plan was not considered necessary. Owing to the shortage of fine yarn, the small-scale units and the hosiery industry were not working to their full capacity and it was recommended that the capacity for yarn should be augmented by the installation of 30,000 additional worsted spindles. A target of 146,800 spindles by 1955-56 as compared to 116,800, spindles in 1950-51 was accordingly laid down in the Plan. It was envisaged that this would also reduce the country's dependence on imports of fine yarn from abroad. The production of woollen goods was expected to be stepped up from 18 million lbs. in 1950-51 to about 25 million lbs. by 1955-56.

The progress actually achieved by the industry as against the targets set in the Plan is outlined below. It must, however, be stated that strictly comparable data for 1950-51 and 1955-56 are not available as regards production, consumption etc., in view of certain changes made by the Office of the Textile Commissioner since 1954 in the basis of compilation of data relating to production.

Capacity.—The woollen mill industry comprises two distinct sectors, *viz.* woollen and worsted, based on the raw materials used and the manufacturing process employed. In the woollen sector mainly raw wool and fibres recovered from rags are spun into yarn; the yarn is used for the manufacture of blankets, rugs, meltons, blazer cloth, etc. In the worsted sector, merino and cross-bred wool and wool tops and staple fibre tops are used as the raw materials. The products turned out comprise light varieties such as tropical suitings, bedford cord, flannels, gaberdine, and serges.

At the commencement of the Plan, there were two spinning units, 20 composite mills and 22 powerloom factories in existence having 116,800 woollen and worsted spindles and 2,039 powerlooms. The rated capacity of these units on the basis of a single shift of 8 hours per day amounted to 20 million lbs. of average counts. With the enactment of the Industries (Development and Regulation) Act, 1951, the expansion of the industry came under statutory control as from May 1952; minor expansions were permitted also under the Cotton Textile Control Order, 1948. Taking into account the new units and expansions effected during the period April 1951 to March 1956 there are at present 15 spinning units, 25 composite mills and 79 powerloom factories. The installed capacity as well as the rated capacity of these units on the basis of a double shift are as follows:—

Woollen sector	61,032 spindles for the production of 17 million lbs. of woollen yarn.
Worsted sector	96,416 spindles for the production of 21 million lbs. of worsted yarn.
Powerlooms	3,950 for the production of 48 million yards of woollen and worsted fabrics.

As against an additional 30,000 worsted spindles envisaged in the Plan, permission has already been given for the installation of 57,664 spindles, of which 30,664 spindles have been installed and have commenced working. Licences were also given for 1,700 additional woollen spindles for the production of shoddy yarn. With the implementation of the remaining expansion schemes, the installed and rated capacity of the industry on a two shift basis will be as under:—

Woollen sector	62,768 spindles for the production of 17·5 million lbs. of woollen yarn.
Worsted sector	123,416 spindles for the production of 28 million lbs. of worsted yarn.
Powerlooms	4,051 for the production of 50 million yards of woollen and worsted fabrics.

The regional distribution of woollen mills, and their capacity at the end of 1955-56 and the ultimate capacity expected to be achieved with the implementation of all the sanctioned schemes are as follows:—

State	Number of units	Capacity at the end of 1955-56 (Numbers)			Ultimate capacity after all the expansion schemes have been implemented (Numbers)		
		Woollen spindles	Worsted spindles	Power-looms	Woollen spindles	Worsted spindles	Power-looms
Bombay	12	12,226	47,936	605	12,226	61,056	654
Saurashtra	1	2,130	7,032	84	2,130	7,032	84
Mysore	3	10,478	..	221	10,478	..	221
Uttar Pradesh	4	12,358	9,672	368	12,358	9,672	368
Kashmir	1	1,542	1,500	18	1,542	1,500	18
West Bengal	5	1,380	5,094	76	1,620	6,494	106
Madhya Bharat	1	516	..	20	516	..	20
Punjab	94	20,402	25,182	2,558	21,898	36,462	2,580
Delhi	1	..	..	..	..	1,200	..
TOTAL	122	61,032	96,416	3,950	62,768	123,416	4,051

It will be seen that whereas the powerloom sector of the industry is concentrated in the Punjab, the spinning capacity is located at Bombay, Uttar Pradesh, Saurashtra and Mysore.

Production.—Strictly comparable data for the period 1950-51 to 1955-56 are not available as the production of yarn and cloth was not being separately recorded prior to 1954. The production from 1950-51 to 1953-54 of woollen and worsted yarn and fabrics (excluding the yarn which was meant for consumption by the mills themselves) is given below:—

Woollen and worsted yarn and cloth (Million lbs.)

1950-51	18·4
1951-52	16·5
1952-53	16·9
1953-54	19·5

The production during 1954-55 and 1955-56 of yarn and fabrics separately was as under:—

	1954-55	1955-56 (Estimated)
(a) *Woollen and worsted fabrics* (*Million yards*)		
1. Suitings	5·31	4·93
2. Blankets and rugs	2·07	3·30
3. Melton and shoddy	1·03	0·49
4. *Lohis* and shawls.	1·60	2·14
5. Uniform cloth.	1·21	0·88
6. Other sorts	2·54	3·20
TOTAL	13·76	14·94
(b) *Yarn* (*Million lbs.*)		
1. Woollen yarn	9·10	10·56
2. Worsted yarn	11·64	11·00
TOTAL	20·74	21·56

Owing to the slackness of demand, the production declined during 1951-52 and 1952-53 but since then there has been some improvement. Against the target of 25 million lbs. envisaged for 1955-56, the actual production in 1955-56 has been 14·94 million yards of woollen/worsted fabrics and 21·56 million lbs. of yarn.

Imports.—(*i*) *Woollen manufactures.*—Imports of woollen/worsted piecegoods have been regulated after due consideration of the supply and demand position and with due regard to the development of the indigenous industry. The import of woollen manufactures, mainly woollen/worsted piecegoods, woollen shoddy cloth and woollen goods mixed with other materials from the United Kingdom and Italy showed wide fluctuations during the period under review, the average value per annum being about Rs. 1·4 crores. Imports by land and re-export were negligible. The actual imports have been as follows:—

(Quantity in '000 lbs.)

(Value in Rs. lakhs)

	1950-51		1951-52		1952-53		1953-54		1954-55		1955-56 (Ten months, April to January)	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Blankets and rugs (including woollen blankets mixed with other materials but excluding floor rugs).	215	3·8	16	1·4	187	5·4	490	13·0	706	19·2	990	28·3
Carpets and floor rugs	18	1·2	15	0·8	32	0·9	10	0·8	25	1·2	12	0·5
Hosiery	87	9·9	49	11·7	89	7·0	43	3·9	79	4·6	66	6·4
Woollen and worsted piecegoods	116	12·8	367	45·2	1,434	92·3	754	60·6	365	38·4	548	62·2
Woollen shoddy cloth							849	24·8	956	27·2	490	15·4
Woollen goods mixed with other materials.	110	7·4	381	25·6	1,152	56·7	1,344	50·1	1,526	51·5	1,075	41·3
Ruffle cloth and shawl cloth	6	0·5	..	..	..	..	..	..	..	..	..	..
Roller cloth, clearer cloth and sizing flannel.	137	12·0	165	22·7	52	4·4	183	15·8	24	2·3	19	1·0
Shawls and *lohis* (Numbers)	(39)	N	(2)	N	(1,404)	N	(1)	N	(2,299)	N	(3,431)	0·3
Other sorts	203	8·6	468	17·9	327	7·8	417	7·5	906	15·4	593	14·8
Total of woollen manufactures		56·2		1,25·3		1,74·5		1,76·5		1,59·8		1,71·1

N—Negligible.

(*ii*) *Yarn and knitting wool.*—The indigenous production of worsted yarn being inadequate to meet the demand, sizeable quantities had to be imported from the United Kingdom, Italy and Japan. Imports of worsted yarn have progressively declined since last year with the steady expansion of the indigenous worsted sector. Sizeable quantities of shoddy woollen yarn and small quantities of knitting wool and other sorts of woollen yarn were also imported. The quantity and value of imports of yarn and knitting wool have been as follows:—

Year	Quantity ('000 lbs.)	Value (Rs. lakhs)
1950-51	914	1,09
1951-52	2,502	1,72
1952-53	1,045	96
1953-54	2,189	1,30
1954-55	3,680	1,35
1955-56 (Ten months, April to January)	3,752	98

Exports.—The export of woollen yarn has been made freely licensable since March 1954 but exports have been insignificant.

Exports of carpets and rugs to the United Kingdom, Canada, U. S. A. and Australia constituted the bulk of the exports. The quantity and value of exports fluctuated widely during the period under review; the average value of exports was about Rs. 4·8 crores. The exports have been as follows:—

(Value in Rs. lakhs)

	1950-51		1951-52		1952-53		1953-54		1954-55		1955-56 (Ten months, April to January)	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Carpets and rugs ('000 lbs.).	14,091	556·3	11,591	588·5	7,128	279·5	9,025	369·1	9,604	386·1	7,925	327·4
Piecegoods (Yards)	(21,225)	2·7	(63,788)	8·4	(37,041)	3·0	(58,783)	3·6	(17,751)	1·9	(8,277)	1·1
Shawls (Numbers)	(56,008)	7·9	(39,309)	5·9	(58,777)	7·4	(30,784)	5·4	(25,227)	4·0	(11,541)	2·8
Other sorts of woollen manufactures ('000 lbs.).	1,476	39·8	1,219	46·1	995	37·9	1,116	57·9	1,069	44·9	573	17·5
TOTAL		6,06·7		6,49·0		3,27·9		4,36·1		4,36·9		3,48·9

Consumption.—The consumption of woollen goods in India is low in comparison with other countries. The production of the mill sector was 13·76 million yards in 1954-55 and 14·94 million yards in 1955-56. Production of the cottage sector is estimated at 4·5 million yards. Total production thus amounts to 18-19 million yards. Average annual imports during 1952-55 were about 3·5 million yards and exports were small. The total quantity available for consumption is thus at present of the order of 22-23 million yards.

Quality.—There has been considerable improvement in the quality of indigenous products. Some of the firms have put up most up-to-date processing plants and the quality has generally improved and the range of goods manufactured has also increased considerably. It is also expected that by the end of 1956, two up-to-date finishing plants will be set up in Amritsar where 2,998 powerlooms out of the 3,992 powerlooms in the country are located.

The manufacture of felt and felt hoods and hats has also been commenced since March 1956 by a local firm at Jaipur with a capacity of 108,000 lbs. Their production is expected to go a long way towards meeting defence and civilian requirements.

Raw materials : Raw wool.—The present production of raw wool in India is estimated to be about 60 million lbs. per annum. The quality of wool produced varies according to the area of origin, breed and climatic conditions. Most of the indigenous wool is utilised for the production of coarse blankets, *kamblis*, rugs and carpets.

The different types of wool utilised in the production of woollen goods comprise the following:—

(i) Indian plain wools of coarse and fine variety for the manufacture of army blankets and woollen carpet yarn, tweeds, overcoatings, rugs, etc.

(ii) Hill types for the production of serge yarn and low grade hosiery.

(iii) Cross-bred wools for medium serge warps, worsted wefts and medium hosiery yarns.

(iv) Merino wools for flannels, over-coatings and superfine broad cloths.

Merino and cross-bred wools required for the manufacture of the finer varieties of fabrics are not produced in India and have to be imported—cross-bred from New Zealand and merino from Australia. The other raw materials required are wool tops for the worsted spinning sector of the industry.

The imports of raw wool and wool tops since 1950-51 have been as follows:—

(Quantity in '000 lbs.)
(Value in Rs. lakhs)

	1950-51		1951-52		1952-53		1953-54		1954-55		1955-56 (Ten months, April to January)	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Raw wool :												
From United Kingdom.	6,425	3,21·1	82	6·8	712	17·5	1,238	36·1	1,077	38·5	1,000	19·9
From Australia .	1,615	89·4	2,151	1,92·7	578	19·7	1,907	78·2	999	37·3	1,080	40·1
From New Zealand	2,462	85·2	876	53·5	856	26·0	1,385	51·2	711	24·0	1,933	61·6
From other countries (By sea).	1,237	66·2	307	5·3	261	2·8	160	3·1	17	0·2	123	1·5
From other countries (By land)	N.A.	N.A.	155	1·8	375	5·2	735	9·0	33	0·4	..	..
Total imports .	N.A.	N.A.	3,571	2,60·1	2,782	71·2	5,425	1,77·6	2,837	100·4	4,136	1,23·1
Wool tops :												
From United Kingdom.	Included under raw wool.		5,679	5,25·1	7,593	3,89·0	9,602	6,50·1	10,571	6,56·9	8,646	5,08·5
From other countries			10	0·7	205	12·3	437	33·7	1,000	59·1	2,007	1,22·5
Total import of wool tops.			5,689	5,25·8	7,798	4,01·2	10,039	6,83·8	11,571	7,16·0	10,654	6,31·0
Total imports of raw wool and wool tops.	11,739	5,61·8	9,260	7,85·9	10,580	4,72·5	15,464	8,61·4	14,408	8,16·4	14,790	7,54·1

Imports of raw wool have shown wide fluctuations during the period under review, the average annual quantity being about 4 million lbs. valued at about Rs. 1·6 crores. Imports of wool tops have shown a steady increase reflecting the increased demand from the steadily expanding worsted sector of the industry. As against 5·7 million lbs. of wool tops valued at about Rs. 5·3 crores in 1950-51, imports in 1955-56 are estimated to be about 13 million lbs. valued at about Rs. 9 crores.

Indigenous raw wool was exported on a considerable scale during the period under review. The exports have been as follows:—

Year	Quantity (Million lbs.)	Value (Rs. crores)
1950-51	25·4	7·9
1951-52	18·3	4·9
1952-53	38·0	8·4
1953-54	20·7	5·9
1954-55	30·8	8·6
1955-56 (Ten months, April to January)	25·8	7·5

Most of the exports were directed to the United Kingdom and the United States. Canada, West Germany and France also absorbed some portion of the exports.

Estimated consumption of raw wool.—The estimated consumption of raw wool during 1954 and 1955 is approximately as under:—

	(Million lbs.) 1954	(Million lbs.) 1955
(a) *Consumption of indigenous raw wool* :		
(i) Organised mill sector	5·3	6·6
(ii) Carpet industry	9·0	9·0 (estimated)
(iii) Cottage industry	6 to 7	6 to 7
(b) *Consumption of imported raw wool and wool tops* : (Merino and cross-bred)		
(i) Raw wool	2·34	2·56
(ii) Wool tops	10·12	10·82

Shoddy and waste wool.—Another raw material required is shoddy and waste wool for the manufacture of cheap blankets, rugs and meltons. The present consumption of shoddy wool and shoddy yarn is estimated as under:—

Shoddy wool	About ½ million lbs.
Shoddy yarn	About 2 to 2½ million lbs.

The industry is also utilising staple fibre tops, mainly for mixing with the worsted varieties. At present, staple fibre tops valued at about Rs. 50 lakhs are estimated to be consumed. The entire quantity is being imported.

Capital and labour.—The total capital investment in the industry amounted to Rs. 9·5 crores in 1953. The fixed capital investment on new units and expansions during the period of the Plan is estimated at approximately Rs. 75 lakhs. The labour employed by the industry which was about 15,500 in 1950 is estimated to have risen to 17,000 in 1955-56.

Development Council.—A Development Council for the Woollen Industry was constituted by the Government of India in July 1955 to advise on various matters such as increase in production, improvement in quality, reduction of costs, promotion of better marketing and standardisation of products etc. The Council has so far met twice and made various recommendations, the more important of which are as under:—

(1) With a view to attaining self-sufficiency in the long run, a beginning should be made with the manufacture of cross-bred wool tops to the extent of 5 million lbs.

(2) There is in general no scope for further expansion of either the weaving or spinning capacity of the industry except that mills of uneconomic size might be allowed to come up to the minimum economic size. There is, however, considerable scope for modernisation and replacement of the existing machinery.

(3) The manufacture of shoddy yarn should be expanded to 5 million lbs. and the import of new equipment required for the purpose should be permitted.

(4) There is a need to investigate the possibility of manufacturing fine yarns from Indian wools as such or mixed with cheap imported wools and non-wool fibres on the Continental spinning system, *i. e.* on a semi-worsted principle without combing.

II. Programme of Development in the Second Plan

Estimated requirements.—The demand for woollen fabrics is expected to increase during the Second Plan as a result of increase in population and the improvement in income and living standards. In order to meet the additional requirements, the output of woollen and worsted fabrics by the organised mill sector is expected to be stepped up from the present level of about 15 million yards to about 20 million yards by 1960-61.

For producing 20 million yards of fabrics, about 17·5 million lbs. of yarn will be required by the weaving sector of the industry. The hosiery, cottage and carpet industries also require mill-spun yarn. The Tariff Commission in 1952 assessed the requirements of yarn for the hosiery industry at 4 million lbs. which, it is expected, may increase to 5 million lbs. during the period of the Second Plan. The demand of the cottage sector for mill-spun yarn is not likely to exceed 2 million lbs. The overall requirements of the carpet industry do not exceed 2·5 million lbs. of machine-spun yarn. On this basis the total demand for woollen and worsted yarn will be about 27 million lbs. per annum, comprising 12 million lbs. of woollen yarn, and 15 million lbs. of worsted yarn.

Targets of capacity and production.—The production capacity of 62,768 woollen and 123,416 worsted spindles (expected to be achieved with the implementation of the schemes already licensed) on a double shift basis would be 45·5 million lbs. of yarn as against the total overall requirements of 27 million lbs. of yarn. Thus there is surplus spinning capacity in the industry and there is no scope whatever for expansion in the spinning sector of the industry. The position with regard to powerlooms is that with the present capacity, 48 million yards of woollen worsted cloth can be produced as against the target of 20 million yards envisaged by 1960-61. In view of the surplus capacity existing at present, there is also no need to expand further the weaving sector of the industry.

Even though there is a surplus of both spindleage and loomage, a rigid ban on further expansion is not desirable as various other factors which require special consideration have to be taken into account. One desirable form of expansion would be the development of some of the existing units into economic units wherever feasible and necessary. The number of spindles that would constitute an economic unit is considered to be as under:—

Cap spinning	3,000 spindles.
Flyer and ring	2,000 spindles.
Mule spinning	800 spindles.

As regards the weaving sector, the following could be regarded as constituting an economic unit:—

Woollen fabrics	50 looms.
Worsted fabrics	20 looms.
Shoddy and melton cloth	20 looms.

Capacity for wool tops.—As stated earlier, there has been a considerable addition to the number of worsted spindles in the country, but one of the major handicaps of the industry has been its dependence on imports of wool tops necessary for the production of worsted yarn. There is at present no combing plant in the country. The demand for wool tops has increased progressively from 5·7 million lbs. in 1950-51 to about 13 million lbs. in 1955-56 and is expected to increase to about 18 million lbs. by the closing year of the Second Plan on the assumption that the entire worsted spinning sector will work at least on a single shift basis.

For reducing the dependence of the industry on foreign countries, it is of the utmost importance to establish the combing sector of the industry for the production of wool tops. The merino and cross-bred wool required for this purpose can be obtained from Australia and New Zealand which are nearer to India than the other wool top producing countries. The establishment of combing capacity in the country will entail considerable economy in freight charges and conservation of foreign exchange, create employment in the country and reduce the cost of manufacturing yarn. As it may not be possible in the immediate future to establish capacity equal to the entire requirements on account of the highly specialised techniques involved, the aim might be to establish a capacity for producing about 9 million lbs. of wool tops during the Second Plan period. The establishment of a combing sector will not only reduce our dependence for wool tops on external sources of supply, but will also enable the industry to obtain for use the valuable by-product, *viz.* woollen noil. The wool grease recovered in the combing process can also be used for manufacturing paints and lanolin, which is extensively used in the manufacture of cosmetics, such as cream and lipsticks, inks, paint removers etc.

Shoddy yarn.—The demand for shoddy yarn used in the manufacture of the coarser varieties of woollen fabrics is also expected to increase as this is the cheapest raw material available. It has, therefore, been suggested that in the Second Plan period, about 5 million lbs. of shoddy yarn should be produced indigenously although the present level of demand for the same is only about 3 million lbs. Although there are 61,032 woollen spindles at present, only a few units have got the necessary teasing, garnetting and blending plants to enable them to revert their woollen spinning plants for the manufacture of shoddy yarn. The steps to be taken to encourage the production of shoddy yarn are engaging the attention of the Development Council for the Woollen Industry.

Imports and exports.—With the increase in the production of superior quality fabrics in the country, the imports of these varieties are expected to fall appreciably by the end of the Second Plan, and with the establishment of capacity for producing wool tops imports of these are also expected to decline. On the other hand, imports of merino and cross-bred wool are likely to increase.

Exports of woollen yarn and fabrics (other than carpets and rugs) have been insignificant during the First Plan nor is any substantial export of woollen yarn or fabrics envisaged in the Second Plan especially as foreign countries exporting woollen and worsted yarn and fabrics are more advantageously placed in this respect.

Raw wool.—During the Second Plan, greater attention is proposed to be given to the development of sheep breeding and wool extension centres for which a provision of Rs. 1·5 crores has been made. For developing sheep breeding it is proposed to establish three new farms for producing quality rams. It is also proposed to develop cross-breeding operations in certain areas for the production of the finer types of wool, which are now imported. A fleece-testing laboratory is proposed to be set up at each farm for testing wool produced at sheep and wool extension centres, of which 396 are proposed to be established during the Second Plan.

Capital investment and labour.—The establishment of a capacity of 9 million lbs. envisaged in the combing sector of the industry is expected to involve a capital investment of Rs. 2·25 crores comprising Rs. 90 lakhs of imported machinery and equipment, Rs. 15 lakhs of land and buildings and Rs. 1,20 lakhs of working capital. An amount of about Rs. 30 lakhs is expected to be incurred on the renovation and modernisation programmes of some of the existing mills.

The industry as a whole is expected to provide employment to about 18,000 persons by the end of the Second Plan.

The development programme for the woollen textile industry (mill sector) in the Second Plan is summarised in the following table:—

Spindleage and loomage		1955-56	1960-61
Woollen sector: spindles		61,032	62,768
Worsted sector: spindles		96,416	123,416
Powerlooms		3,950	4,051
Annual rated capacity on double shift working			
Woollen yarn	Million lbs.	17	17·5
Worsted yarn	,,	21	28
Woollen and worsted fabrics	Million yards	48	50
Production			
Wool tops	Million lbs.	..	9
Woollen yarn	,,	10·6	12
Worsted yarn	,,	11·0	15
Woollen and worsted fabrics	Million yards	14·9	20

B. COTTAGE SECTOR

The cottage sector of the woollen textile industry comprises two sections *viz.* wool weaving (handloom) and wool spinning and weaving (*Khadi*). The industry is concentrated in villages and provides full and part-time employment to weavers, peasants and their families. The main articles produced are *kamblis*, carpets, tweeds, shawls, *lohis* etc. *Kamblis* are mostly consumed in the areas adjacent to the producing centres, while carpets are mostly exported abroad. Tweeds, shawls, *lohis*, etc. are partly absorbed in the country and partly exported.

Wool weaving (*Handloom*).—The total number of handlooms in the cottage sector is roughly estimated at 100,000 comprising 15,000 carpet looms, 50,000 pit looms and 30,000 to 35,000 throw and fly shuttle looms. The carpet looms are located at Bhadoi, Mirzapur, Agra and Banaras in Uttar Pradesh, Amritsar in the Punjab, Srinagar in Kashmir and Warangal in Hyderabad. Pit looms are concentrated in the State of Hyderabad, Mysore, Bombay, Bihar and Madhya Pradesh while throw and fly shuttle looms are located in the Punjab, PEPSU, Uttar Pradesh and Himachal Pradesh. Owing to the seasonal nature of the demand for woollen goods, it is estimated that about 20,000 out of the 85,000 pit, throw and fly shuttle types of looms are usually engaged in the manufacture of cloth other than woollen.

On the basis of information collected from various State Governments, the production of the cottage sector is roughly estimated as under:—

Kamblis, blankets and blanketing cloth	3·0 million yards, *i. e.*, about 5 million lbs.
Rufflle and shawls	0·25 million yards.
Patoo cloth & tweeds	1·0 million yards.
Carpets and rugs	10·0 million lbs.

The cottage woollen industry has been playing a very important role in the rural economy of India and has been responsible for the preservation of age-old craftmanship. It is estimated that the industry provides employment to about 500,000 persons. The *kamblis* manufactured although poor in quality, serve various purposes *e. g.* as a floor rug in summer, rain-coat in the monsoon and as a wrapper in winter. The carpet industry is an important earner of foreign exchange, as the bulk of the carpets produced are exported. The shawls of Kashmir, the druggets of Mirzapur and Bhadoi, and *namdas* from Jammu and Kashmir and Kulu are some of the other important earners of foreign exchange.

The industry consumes about 15-16 million lbs. of indigenous raw wool. Carpets and rugs are the most important items of export of the woollen industry and are mainly being produced by the handloom sector; the average annual value of exports of carpets and rugs alone during the period of the First Plan is estimated at about Rs. 4 crores as against the average total exports of woollen manufactures valued at Rs. 4·5 crores.

During the period of the Second Plan, a provision of Rs. 2 crores has been earmarked for the development of the woollen handloom industry.

The Development Council for the Woollen Industry has suggested various measures for improving the output and quality of *kamblis* produced by the cottage sector. It has recommended the replacement of pit looms by the improved type of fly shuttle looms and the establishment of demonstration-*cum*-training centres and up-to-date finishing and dyeing centres in important areas. The Council has also suggested that standards may be prescribed for woollen *kamblis* and carpets meant for export.

Wool spinning and weaving (khadi).—The development programme for woollen *khadi* (from hand-spun woollen yarn) aims at increasing the production of blanketing cloth from 250,000 yards in 1956-57 to 1 million yards in 1960-61, of sub-standard cloth from 500,000 yards to 1 million yards and of other varieties of cloth from 125,000 yards to 1·5 million yards. These targets are to be achieved by organising production centres in the principal wool producing areas, by the establishment of finishing and dyeing plants and the setting up of training centres equipped with improved *charkhas* and looms.

C. WOOLLEN HOSIERY

According to the estimates made by the Tariff Commission in 1952, the woollen hosiery industry consists of 875 small-scale units, the bulk of them located at Ludhiana (Punjab) and the remainder dispersed over the States of Uttar Pradesh, West Bengal, Delhi and Bombay. According to a recent survey conducted by the Government of the Punjab, there are 800 hosiery units at Ludhiana. The total number of knitting machines of all kinds engaged in the manufacture of hosiery articles is as under:—

1. Flat machines	1,500
2. Hand driven circular machines	2,000
3. Power driven circular machines	500
4. Hand socks machines . . .	5,000
5. Raschal machines	80

The total capital investment in all the hosiery units is estimated to be of the order of Rs. 3 crores, of which the Ludhiana units alone account for a little over Rs. 2·5 crores. The industry is predominantly run on a cottage and small-scale basis, with 90 per cent of the units employing less than 20 workers. The majority of the machines employed in the industry are manually operated . The Ludhiana industry works only during July-December for manufacturing woollen hosiery. During the season about 20,000 workers are engaged directly in the establishments and an equal number, mainly women, outside. The machinery required for the production of hosiery articles is also being manufactured at Ludhiana.

It is estimated that about 4 million lbs. of hosiery and knitting yarn are at present consumed by the Ludhiana hosiery units and about 0·5 million lbs. by the hosiery units located in other States. Some of the organised mills in the industry also produce worsted hosiery goods; the consumption of worsted hosiery and knitting yarn by these mills is estimated at 0·5 million lbs. Thus the total quantity of yarn consumed by the hosiery industry is estimated at around 5 million lbs.

The quality of the indigenous woollen hosiery goods is satisfactory and the industry has captured practically the whole of the domestic market for the cheaper grades of woollen hosiery which form the bulk of the consumption in the country. With the expansion of the worsted sector of the woollen industry, adequate supplies of worsted yarn are available locally for meeting the requirements of the hosiery industry. With the general improvement in income and living conditions envisaged during the Second Plan, the hosiery industry is also expected to expand its output with a view to meeting the increase in demand anticipated during the Second Plan period.

F. Timber Industries

44. MATCHES

Match factories are broadly classified into four categories depending upon their production. These are:—

(i) 'A' class factories producing 5 lakh gross boxes or above per annum.

(ii) 'B' class factories producing over 100 gross boxes per day but less than 5 lakh gross per year.

(iii) 'C' class factories producing less than 100 gross boxes but more than 25 gross per day.

(iv) 'D' class factories producing 25 gross boxes or less per day.

Although this classification is essentially based on excise regulations, it provides a general line of demarcation between the organised and cottage sectors of the match industry. While the 'A' class factories can be considered to belong to the class of large-scale organised units, the other three categories of match factories can be considered as falling within the cottage sector. While the 'A' class factories are mechanised and account for the bulk of the production, the rest are mainly hand-operated and provide greater employment.

I. Review of Progress in the First Plan

Capacity and production.—At the beginning of the First Plan period, the annual rated capacity of the match industry inclusive of all categories of factories was estimated at 35·3 million gross boxes (706,000 cases, each of 50 gross boxes of 60 sticks). Of this, the Western India Match Co. (WIMCO) and the Assam Match Co. (AMCO) accounted for 22·8 million gross boxes or nearly 65 per cent of the capacity. About 238 other smaller and cottage units (mainly 'B' and 'C' class factories) accounted for the remaining 35 per cent of the capacity. The First Plan envisaged a moderate increase in capacity by 3 million gross boxes by 1955-56 through the creation of a new class of cottage factory having a daily capacity of only 50 gross boxes.

There has not been any significant increase in the capacity of the match industry since April 1951. The number of factories in production, however, increased from 238 in 1950-51 to 242 in 1955-56 as indicated below:—

	1950-51	1955-56
'A' Class factories	6	8
'B' Class factories	105	104
'C' Class factories	127	77
'D' Class factories	..	53
	238	242

The decline in the number of 'C' class factories may be explained by the fact that many of them have now come under the category of 'D' class units—a new class recently recognised by the Government (*vide infra*).

The First Plan, envisaged the production of matches rising from 29·1 million gross boxes in 1950-51 to 35·3 million gross boxes in 1955-56 as a result of the WIMCO and AMCO factories operating at over 95 per cent of their capacity, and the remaining units at over 85 per cent of their capacity. More up-to-date figures available with the Central Board of Revenue, however, place the production of matches of all varieties in 1950-51 at 29·8 million gross boxes (27·1 million gross boxes in terms of boxes of 60 sticks). Except for a slight decline in the year 1953-54, the production has steadily risen during the remaining period of the Plan, the estimated production in 1955-56 being nearly 10 million gross boxes above the level in 1950-51. The following table indicates the production of matches during the last six years:—

(Figures in thousand gross boxes)

Year	60's	40's	Total 60's + 40's	Others including Bengal Lights	Total of all varieties
1	2	3	4	5	6
1950-51	22,527	6,922	29,449	356	29,805
1951-52	23,633	7,977	31,610	268	31,878
1952-53	25,262	10,066	35,328	387	35,715
1953-54	21,608	11,553	33,161	484	33,645
1954-55	19,822	16,969	36,791	409	37,200
1955-56 (Ten months, April-January)	16,857	17,203	34,060	586	34,646
1955-56 (Estimated)	18,400	20,200	38,600	620	39,220

Much of the increase in additional production during the Plan period was achieved through the better utilisation of capacity in the cottage sector. This is evident from the increase in the production of 40's, which are produced mainly by the cottage sector. The production of 40's has increased from about 7 million gross boxes in 1950-51 to 17 million gross boxes in 1954-55 and is estimated to reach about 20 million gross boxes in 1955-56.

In obtaining a correct assessment of the actual increase in the production of matches, it is necessary to compare the production for different years on a uniform basis. The table given below indicates the production of matches (excluding Bengal Lights and others which are negligible) expressed in terms of gross boxes of sixty sticks.

Year	Production (Million gross boxes of sixty sticks each)
1950-51	27·1
1951-52	28·9
1952-53	31·9
1953-54	29·3
1954-55	31·1
1955-56 (Ten months, April-January)	28·3
1955-56 (Estimated)	32·0

Imports and exports.—Imports of matches have been negligible being confined to special varieties. Exports have declined since 1950-51. Statistics of imports and exports for the last six years are as under:—

Year	Imports (Gross boxes)	Exports (Gross boxes)
1950-51	5,910	75,524
1951-52	479	21,965
1952-53	403	31,625
1953-54	467	175
1954-55	1,150	531
1955-56 (Ten months, April-January)	113	500

An export target of 0.3 million gross boxes per annum was envisaged under the Plan. This was not, however, achieved mainly because of a considerable fall in the export of matches to Pakistan which had hitherto been the chief external market. With the substantial expansion of the Lahore factory of WIMCO, the dependence of Pakistan on external supplies of matches has been considerably reduced with consequent decline in the import of Indian matches.

Consumption.—At the beginning of the First Plan, the demand for matches was estimated at 28 million gross boxes. It was envisaged in the Plan, that the demand for matches would increase to about 35.3 million gross boxes by 1955-56 including 0.3 million gross boxes for export. Since imports and exports of matches have been negligible during the Plan period, the actual consumption may be considered approximately to correspond to production in the country. On this basis, it may be estimated that the indigenous consumption of matches has increased from 28.9 million gross boxes in 1951-52 to about 32.0 million gross boxes in 1955-56 (in terms of sixties). The average consumption in the last three years amounts to about 31.0 million gross boxes per annum.

Capital and labour.—The total productive capital employed in the match industry is estimated to be about Rs. 4.5 crores, the bulk of the capital being invested by WIMCO and AMCO. The share of the foreign capital is approximately Rs. 1.25 crores.

The number of persons employed in the match industry is estimated to be about 24,500 of which about 8,500 are employed in the mechanised sector and about 16,000 in the cottage sector.

Action on main recommendations.—Some of the important recommendations made in the Plan and the action taken thereon are indicated in the following paragraphs :—

(i) It was recommended that in order to overcome shortage of soft wood, particularly *samul* wood, supplies of which are fast being depleted, planned efforts should be made to raise plantations of match wood species. It was further suggested that for meeting expenditure in connection with the raising of match wood plantations, the Government should consider allotment of 1 per cent of the total excise revenue derived from matches for development work. These proposals have been accepted and a number of State Governments have already begun the raising of match wood plantations. So far Uttar Pradesh, Assam, Madras, Travancore-Cochin, Madhya Pradesh and Bombay are participating in the scheme for cultivation of soft wood plantations on the understanding that the expenditure involved will be shared by the State Governments and the Central Government on a 50 : 50 basis. The scheme provides for the allotment by the Central Government of 1 per cent of the total excise revenue from matches as its contribution towards the implementation of the scheme. The finance thus made available annually will be of the order of Rs. 8 lakhs on the basis of the excise revenue in 1951-52. Under this scheme about 9,000 acres of land have been added to the soft wood plantations during the First Plan period and according to the decisions so far taken regarding the extension of this scheme under the Second Plan, about 50,000 acres of additional land would be covered during 1956-61.

(ii) It was recommended that additional capacity should be created for the manufacture of all the potassium chlorate required by the match industry. There has, however, been no significant addition to capacity. Apart from the WIMCO who are the major producers of potassium chlorate, the Travancore Chemical Manufacturing Co., at Kundara produce about 300 tons of potassium chlorate per annum. The Mettur Chemical and Industrial Corporation have recently been permitted to produce 600 tons of potassium chlorate per annum by the chemical process using chlorine. Certain other schemes by some match manufacturers of Sattur and Sivakasi (South India) for the manufacture of 1,000 tons per year of potassium chlorate for their own consumption are under examination.

(iii) Having regard to its considerable employment potential, the Plan laid emphasis on the development of the medium and cottage sector of the industry. Various measures of assistance such as the organisation of industrial co-operatives for the bulk purchase of raw materials and the sale of finished products were also suggested in the Plan. The All India Khadi and Village Industries Board, which was set up in February 1953, was made responsible for the organisation and development of the cottage match industry. Among the various measures taken by the Board to assist the industry are the establishment of a laboratory, production-*cum*-training centres, the marketing of cottage matches through the *Khadi Bhandars* and the provision of a subsidy on equipment for new cottage units. The rebate on excise duty to cottage units was also enhanced from March 1955. This measure provided considerable relief to the cottage sector of the industry and improved its competitive position *vis-a-vis* the large-scale manufacturers.

The Plan also recommended the decentralisation of the industry through the creation of a new class of cottage factory having a daily capacity of 50 gross boxes. Factories of a new class, known as 'D' class factories, producing up to 25 gross boxes a day are being established in the country through assistance rendered by the All India Khadi and Village Industries Board.

II. Programme of Development in the Second Plan

Estimated requirements.—The average consumption of matches during the last three years has been of the order of 31 million gross boxes (in terms of sixties) and may be taken as the present annual demand. In estimating the requirements of matches during the Second Plan account has to be taken of the comparatively small rise in consumption during the First Plan period and the inelastic nature of the demand. The chances of developing any sizeable exports also do not seem to be very bright. Taking all these factors into consideration, it would appear reasonable to reckon on an increase in demand in proportion to the growth of population and a small marginal increase in the present *per capita* consumption. On this basis, the requirements of matches may be estimated at 35 million gross boxes by 1960-61.

Target of capacity and production.—Since the total demand for matches is estimated to be of the order of 35 million gross boxes by 1960-61, production of the same order is envisaged by that date. The present annual capacity of 35.3 million gross boxes is slightly more than the estimated demand and it may therefore seem unnecessary to increase the capacity of the industry further during the Plan period. Since, however, the cottage sector does not always operate to full capacity, a moderate increase in capacity in this sector may not be entirely unjustified. The cottage sector has considerable potentialities for providing large-scale employment and the main emphasis during the Second Plan period should be to assist this sector of the industry to improve its output and quality. In the interest of developing the cottage sector and to provide it with a fair share of the market, no increase in capacity in the large-scale sector should be permitted during the Second Plan period and the additional demand arising during this period should be entirely reserved for the cottage sector.

Development programme for the cottage match industry in the Second Plan.—The development programme for the cottage match industry recommended by the Karve Committee includes organisation of 2,000 'D' class factories during the Plan period. It also envisages the setting up of two research laboratories and a number of marketing depots and the grant of financial assistance in the form of loans to co-operative societies. The All India Khadi and Village Industries Board which is entrusted with the development of this industry, proposes to train 1,500 persons in the art of match making by providing stipends to the trainees. The Board also proposes to organise a number of paripatetic schools and demonstration parties all over the country to train the artisans in rural areas. The Karve Committee suggested an allocation of Rs. 1 crore for the implementation of the programme.

The Central Social Welfare Board is also undertaking the establishment of cottage match factories under their Urban Family Welfare Scheme. It has been decided to locate these units at Delhi, Vijayawada, Poona, Hyderabad, Gauhati, Nagpur and Chandigarh. The Match Factory at Delhi has already gone into production. Each unit has the capacity to produce up to 500 gross boxes per day. It is expected that each of the units will provide employment to 250 women at the factory and also work to 250 women in their homes. The expenditure on each unit is estimated to be of the order of Rs. 2·5 lakhs which will be met from the funds allocated to the small-scale industries in the Second Plan. These units will be organised on a co-operative basis.

The following table summarises the development programme of the match industry during the period of the Second Plan:—

		1955-56	1960-61
Annual rated capacity	Million gross boxes.	35·3	35·3
Production	,,	32·0 (Estimated)	35·0

45. PLYWOOD

I Review of Progress in the First Plan

Targets.—At the beginning of the First Plan, the annual rated capacity of the plywood industry was estimated to be 138·84 million square feet. Taking into account the programmes for the expansion of the industry then under contemplation, it was visualised that the annual rated capacity of the industry would increase to 180—190 million square feet by 1955-56.

The demand for tea chest plywood was estimated to reach a figure of 110 million square feet and that for commercial plywood a figure of about 40 million square feet by the end of the Plan period. Production of tea chest plywood was expected to rise to only 100 million square feet by 1955-56 and it was recommended that, if the supplies of raw material showed improvement enabling additional production to be undertaken, then imports of tea chest plywood might be reviewed and correlated with increase in domestic production.

Capacity and production.—In May 1952 the Development Wing of the Ministry of Commerce and Industry (DWCI) estimated the annual capacity of the 57 approved factories on their list at 160·29 million square feet. At the beginning of 1953 more factories were brought on the approved list of DWCI and the capacity of the factories was reassessed. This resulted in the annual rated capacity of the 70 factories on the approved list being estimated at 144 million square feet.*

The number of factories on the approved list of the DWCI has since come down to 64 as some of the factories, which have been out of production for a long period, have been removed from the list. This has not, however, affected the estimate of the capacity of the industry to any appreciable extent. The capacity is reckoned to be at present about 150.578 million square feet.

The present regional distribution of plywood factories and their rated capacity are as under:—

State	Number of factories	Annual rated capacity (Million sq. ft.)
West Bengal	34	69.246
Assam (including N. E. F. A.)	13	33.570
Travancore-Cochin	6	8.748
Madras	5	18.054
Bihar	1	1.080
Mysore	2	8.800
Bombay	1	5.000
Madhya Pradesh	1	1.080
Uttar Pradesh	1	5.000
TOTAL	64	150·578

Apart from the factories, which are on the approved list of the DWCI there are a large number of unapproved factories the bulk of which are concentrated in and around Calcutta. It was estimated by the Tariff Commission in 1953, that they have an aggregate capacity of about 9 million square feet.

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* The lower installed capacity in early 1953 as against May 1952, is explained by the fact that in the case of factories in Madras, Travancore-Cochin and Bombay, the capacity as assessed in 1953 was considerably lower than the estimate of May 1952.

It was envisaged in the Plan that the production of tea chest plywood would be of the order of 60 million square feet in 1951-52, 75 million sq. ft. in 1952-53 and 100 million sq. ft. in 1955-56. The actual production of tea chest plywood and commercial plywood during the last six years has been as follows:—

Year	Unit	Tea chest	Commercial	Total
1950-51	Million square feet	44·94	8·88	53·82
1951-52	,,	65·04	10·16	75·20
1952-53	,,	71·00	12·25	83·25
1953-54	,,	50·35	10·55	60·90
1954-55	,,	77·90	16·19	94·09
1955-56 (Ten months, April—January)	,,	74·60	16·63	91·23
1955-56 (Estimated)	,,	90·00	20·00	110·00

It will be seen that the targets of production laid down in the Plan were nearly achieved in the first two years of the Plan. The industry, however, received a setback in 1953-54 due to a slump in the tea trade, resulting in accumulation of stocks of tea chests. The effect of this was such that production in nearly 30 per cent of the plywood factories had to be stopped. In 1954-55, however, there was a marked increase in output and it is estimated that in 1955-56 production will have reached about 90 million square feet.

Consumption.—(*i*) *Tea chest plywood.*—At the beginning of the First Plan, the demand for tea chest plywood was estimated at 100 million square feet and as already stated, it was expected to rise to 110 million sq. ft. by 1955-56. The actual consumption of tea chest plywood, on the basis of production plus imports during the Plan period has been as shown in the following table:—

Year	Unit	Production	Imports	Consumption
1951-52	Million square feet	65·04	35·0	100·04
1952-53	,,	71·00	18·0	89·00
1953-54	,,	50·35	7·2	57·55
1954-55	,,	77·90	3·6	81·50
1955-56 (Ten months, April to January)	,,	74·60	2·1	76·70
1955-56 (Estimated)	,,	90·00	2·6	92·60

As mentioned earlier, the low offtake in 1953-54 is accounted for by the slump in the tea trade in that year. Since then the consumption has steadily gone up; but it is still rather less than what was expected.

(*ii*) *Commercial plywood.*—From the trend of production, it appears that the demand for commercial plywood in 1955-56 is of the order of 20 million square feet. The demand for commercial plywood, although on the increase, has not developed as fast as was expected and is considerably below the level of 40 million square feet visualised at the end the First Plan. Insufficient knowledge amongst potential users of the utility and advantages of plywood has retarded the growth of demand for it. The commercial plywood manufacturers have, on the other hand, not done enough educational advertising or salesmanship to disseminate the necessary information. This deficiency is now being realised by the manufacturers who are taking measures to popularise the use of plywood.

Quality.—The quality of indigenous tea chest plywood is reported to have shown considerable improvement since the Tariff Board's Enquiry in 1950. As a result, the Tariff Commission in 1953, reduced the margin for consumer prejudice in the fair selling price of the indigenous material from 15 per cent to 7·5 per cent. In order to bring about improvement, the industry set up a number of laboratories at its own cost. The Government have established Inspectorates at six centres in the country for carrying out a random check of 25 per cent of the output of the approved factories and have set up equipment for testing plywood at these Inspectorates. While some of the units have equipped themselves adequately so that they are able to produce to quality, other units are still lagging behind in their equipment. Efforts need to be continued to improve the standard of equipment in such factories in order to ensure and maintain production of the requisite quality.

Capital and labour.—A sum of about Rs. 3·5 crores is estimated to have been invested by the 64 plywood factories at present on the approved list of DWCI. The number of persons employed at present by these factories is estimated to be about 7,000.

Tariff protection.—Besides receiving assistance from the import control policy of the Government, the industry has also been helped by the imposition of a protective duty. Protection was first granted to the plywood industry in 1948, when the then existing revenue duty of 30 per cent *ad valorem* was converted into a protective duty at the same rate. The duration of the duty was extended from time to time till December 1953. In 1953, the case of the industry for continuance of protection was again referred to the Tariff Commission for review and the recommendation of the Commission that the existing protective duty of 31½ per cent *ad valorem* should continue till the end of 1957, was accepted by the Government.

Problems of the industry.—The main difficulty experienced by the plywood industry during the Plan period has been in regard to the supply of adequate quantities of suitable types of timber. Although fairly substantial quantities of timber are available in the Assam area, full advantage could not be taken of these resources owing to difficulties of transport between Assam and Calcutta where the industry is concentrated. To take advantage of the plentiful supplies of timber in Assam, some of the plywood factories have shifted there from West Bengal. The Calcutta factories are at present predominantly dependent on timber supplies from the Andamans, but these are not regular on account of shipping difficulties. Consequently there has been periodic shortage of timber and reduced output. It is of the utmost importance for the smooth working of the industry that measures be taken to ensure adequate and regular supplies of timber.

II. Programme of Development in the Second Plan

Estimated requirements.—(*i*) *Tea chest plywood.*—On the basis of imports and domestic production, the annual consumption of tea chest plywood is estimated at present to be of the order of 90 million sq. ft. The demand for tea chest is closely related to the export target envisaged for tea. It is considered that during the Second Plan, there may be a moderate expansion of about 30 million lbs. in the exports of tea. It is therefore considered that the demand for tea chest plywood might rise to 100 million sq. ft. by 1960-61. This estimate was generally endorsed at a meeting of the representatives of the industry.

(*ii*) *Commmercial plywood.*—It is somewhat difficult to estimate the trends of demand for commercial plywood in future years because of the possibility of other products like hard board and bamboo boards being substituted for it. The demand for commercial plywood is also dependent upon the general standard of living, and upon the sale and advertising techniques adopted by manufacturers. Taking into account all these factors, it is estimated that the demand for commercial plywood is likely to be between 30 and 50 million square feet by 1960-61.

Schemes licensed and under implementation.—The installation of one new unit and the expansion of one of the existing units have been licensed under the Industries (Development and Regulation) Act. Details of these are given below:—

(i) Wood Crafts (Assam) have been given a licence to put up a plywood factory in Assam. The factory is expected to manufacture annually 4.5 million sq. ft. of tea chest plywood, commercial plywood, aircraft plywood and marine plywood;

(ii) Western India Plywoods, Baliapatam (Madras) have been allowed to expand their capacity from 9 million sq. ft. to 11.4 million sq. ft. The licence has been given to the firm on the understanding that it will not increase its capacity for tea chest plywood.

In addition to the above, general approval has been given for the establishment of a plywood factory in North Andamans by P. C. Roy and Co. with an annual capacity of 10 million square feet on the basis of an agreement entered into between this company and the Ministry of Food and Agriculture. The party has, however, not so far obtained a licence.

With the completion of the schemes mentioned above, including that of P. C. Roy and Co., the annual rated capacity of the industry will increase from 150·578 million sq. ft. to 167·478 million sq. ft.

Targets of capacity and production.—Since the total demand for tea chest and commercial plywood is estimated to be of the order of 130—150 million square feet by 1960-61, production of the same order is envisaged by that period. As already mentioned, the annual rated capacity of the industry is expected to increase to 167·478 million sq. ft. when all the schemes under implementation are completed. It is considered that this capacity is adequate to meet the requirements of both tea chest and commercial plywood by 1960-61, and it does not at present seem necessary to establish any more new units during the Second Plan period. Expansion of uneconomic units to an economic size will, however, have to be considered favourably.

Miscellaneous.—Since tea is such an important export industry for this country, it is essential that tea chests of good quality should be used for packing tea for export. The main efforts of the industry should, therefore, continue to be directed towards the improvement of the quality of their products. It is suggested that proposals made by existing units for expansion for the manufacture of quality tea chests should be favourably considered.

The following table summarises the development of the plywood industry envisaged during the Second Plan :—

	1955-56		1960-61	
	Installed capacity	Production	Installed capacity	Production
Tea chest plywood (Million sq. ft.)	150·6	90	167·5	100
Commercial plywood ,,		20		30-50

FIBRE-BOARD

In recent years the manufacture of competitive products similar to plywood has developed in some of the advanced countries. These products are generally known as fibre-boards or hard boards and are made by disintegrating wood or saw mill waste or similar material into semi-liquid mush and then felting the fibres together again into continuous sheets. Since fibre-board can be produced from waste materials and given superior finish and appearance, its use is becoming increasingly popular, particularly as wall boards for houses, railway coaches etc.

Fibre-boards are not at present manufactured in the country and the requirements are met entirely by imports, mainly from the U. S. A., Sweden, Norway and Finland. On the basis of the best year's imports, the present demand can be estimated at 25 million sq. ft. The potential demand is, however, likely to be much higher owing to new building techniques and the scope for the use of fibre-boards as a cheap substitute for conventional furniture and constructional materials. It is somewhat difficult to estimate the probable demand for fibre-boards during the Second Plan, but as a very rough estimate it can be assumed that it will be from 40 to 50 million square feet by 1960-61.

Although raw materials for the production of fibre-board are available in the country, interest in setting up factories for its production has, in the past, not been very great, as the capital required is relatively high (in the neighbourhood of Rs. 1 crore). Certain proposals for the manufacture of fibre-board are, however, under consideration of the Ministry of Commerce and Industry and it is expected that indigenous production will be established during the Second Plan period.

G. Food Industries

46. SALT

I. Review of Progress in the First Plan

Targets.—The total area under salt cultivation at the beginning of the First Plan was about 55,600 acres and this was expected to increase to about 65,200 acres by 1955-56. The production of salt was expected to increase from about 72·1 million maunds in 1950-51 to 83·7 million maunds by 1955-56. It was thought that the realisation of this target would enable domestic requirements to be met in full and would leave some surplus for exports to neighbouring countries.

Capacity and production.—The area under salt cultivation increased from 55,600 acres in 1950-51 to 80,216 acres in 1955-56 and the number of salt units increased from 121 in 1950-51 to 146 in 1955-56. A State-wise break-up of licensed salt units in 1955-56 compared to that in 1950-51 is given below:—

States	Number of units	
	1950-51	1955-56
1. Rajasthan	3	4
2. Bombay	17	22
3. Madras	53*	36
4. Andhra	...	28
5. Orissa	5	6
6. West Bengal	5	4
7. Saurashtra	22	30
8. Kutch	4	4
9. Travancore-Cochin	11	11
10. Himachal Pradesh	1	1
TOTAL	121	146

* Figure relates to composite Madras State.

There has been satisfactory progress in the production of salt during the First Plan period. In 1951 the country attained self-sufficiency in salt for the first time in 100 years. It has also been possible to export small quantities of salt since 1951. The region-wise production of salt during 1950—55 is given in the table below:—

Regions	Unit	1950	1951	1952	1953	1954	1955
1. Rajasthan	Lakh maunds	130·8	117·9	74·0	86·8	85·8	76·7
2. Bombay	,,	210·3	209·1	229·0	239·9	216·2	244·6
3. Saurashtra	,,	121·7	148·8	198·0	217·5	164·2	215·7
4. Kutch	,,	19·5	20·8	32·8	37·2	43·8	68·7
5. Madras	,,	192·3	192·5	164·8	193·7	107·3	109·1
6. Andhra	,,	..	..	..	..	44·3	31·0
7. Travancore-Cochin	,,	14·5	17·6	17·6	16·6	13·6	15·7
8. Orissa	,,	9·0	10·1	10·1	13·9	7·1	9·1
9. West Bengal	,,	0·7	0·5	0·6	1·2	1·2	1·6
10. Himachal Pradesh	,,	1·4	1·5	1·6	1·6	1·1	1·4
11. Unlicensed production	,,	13·0	25·0	40·2	52·5	54·5	36·9
TOTAL		713·2	743·8	768·7	860·9	739·1	810·5

Peak production of 86·1 million maunds was attained in 1953, which was in excess of the target of 83·7 million maunds envisaged under the First Plan. The production in 1954 was at a somewhat lower level than that attained in the previous three years. This fall in production was mainly due to unfavourable weather conditions and accumulation of stocks in the factories in 1953, when the total production exceeded the requirements of internal consumption and exports. Production, however, improved in 1955, and was about 10 per cent above the 1954 level.

Imports and exports.—Import of salt has not been allowed since 1950, but the Indo-Pakistan Trade Agreement of August 1955 makes a provision for the import of 10 lakh maunds of rock salt into India from Pakistan during the period September 1955 to August 1956. No import, however, has taken place so far.

The exports of salt from 1950 to 1955 were as follows:—

	(Lakh maunds)
1950	2.2
1951	19.3
1952	79.5
1953	80.0
1954	62.4
1955	66.8

Exports increased after 1950, but in 1954 fell by about 15 per cent. This was mainly due to a fall in the price of salt in Japanese market. Exports rose again, however, somewhat in 1955. Japan is the main external market for Indian salt.

Exports to Japan and other foreign countries from Madras, Andhra and Bombay ports are allowed on 'free' licensing so as to encourage exports of salt. Exports from the West Coast (Saurashtra and Kutch), however, continue under the licensing system, though licences are granted liberally to manufacturers as well as recognised general exporters. The possibilities of expanding export markets are being explored.

Consumption.—The Salt Experts Committee estimated that the consumption of salt would increase from about 72·6 million maunds in 1950-51 to about 81·7 million maunds by 1955-56, as given below:—

Consumption in 1955-56	(Million maunds)
Household consumption	57.2
Industries (alkali, soap, paper), etc.	10.8
Live-stock and agriculture	8.2
Miscellaneous uses	5.5
	81.7

The actual internal consumption of salt during 1955-56 has been only about 74 million maunds and has thus fallen short of the estimate made by the Experts Committee. The break-up of this actual internal consumption figure is indicated below:—

	(Million maunds)
Household consumption (including agriculture, cattle feed, etc.)	66.9
Industry	6.8
TOTAL	73.7

Quality of salt and ISI specifications.—Prior to 1949, no serious attempt was made to improve the quality of production especially in the private salt factories. Steps, however, were taken in 1951, when the Government of India, on the recommendations of the Indian Standards Institution, notified that the minimum content of sodium chloride in edible salt should be 92 per cent in 1951, 94 per cent in 1952 and 96 per cent in 1953. Against this, several representations were received during 1952 from salt manufacturers and their associations stating that the rise in sodium chloride content from 92 per cent in 1951 to 94 per cent in 1952 was difficult to attain in the short span of one year. The Government, after careful consideration, revised the previous notification by fixing the minimum standard for edible salt at 94 per cent sodium chloride content to be attained by 1953. This was enforced on all licensed factories. It was decided to continue the same standard during 1954 as well as in 1955 so as to allow the small manufacturing units to realign their holdings for the production of standard quality. The ISI has fixed the standard of salt for fish curing and leather curing at 96 per cent and 81 per cent sodium chloride content respectively.

The Salt Experts Committee considered that one sample out of every 5,000 maunds of salt produced would have to be analysed for proper quality control and recommended that for this purpose a number of test laboratories would have to be run by the Salt Department. Accordingly, a number of test laboratories have been established at different centres in the country. So far, about 26 such laboratories have been set up.

A Central Salt Research Station was established at Bhavnagar in Saurashtra under the administrative control of the Council of Scientific and Industrial Research. Besides, a model farm and a salt research laboratory have been established at Wadala in Bombay for demonstration purposes. Recently, one more model farm was opened at Tuticorin in the Madras Region.

Capital and employment.—The total fixed capital investment in the industry is of the order of Rs. 8,29·8 lakhs out of which the investment in the public sector is Rs. 1,07·1 lakhs and that in the private sector, Rs. 7,22·7 lakhs.

The total labour employed in the Salt works per day (1955) was about 29,300 of which, about 3,530 were in the Government salt works and 25,770 in the private salt factories. Besides, on an average about 10,000 labourers work per day in unlicensed salt works in the country.

Action on recommendations:—

(1) *Formation of co-operatives of small manufacturers.*—As a general policy the grouping of uneconomic units into economic ones on a co-operative basis is being encouraged by the Salt Commissioner in the following way:—

(i) Co-operative societies are preferred when leases of lands are assigned;
(ii) Priority is given to co-operative societies for the movement of wagons of salt;
(iii) Co-operative societies are allotted free land;
(iv) Efforts are made to consolidate the small holdings and realign them by promoting the formation of co-operative societies through persuasion and by explaining to the licencees the advantages of co-operation.

(2) *Utilisation of the salt cess for the development of the salt industry.*—In order to regulate the levy of the salt cess and utilisation of the funds therefrom, the Salt Cess Act, 1953 was enacted and came into force from January 2, 1954. The purposes for which the cess should be utilised have been specified in the Act as follows:—

(a) meeting the expenditure incurred on account of the Salt Organisation maintained by the Central Government;

(b) meeting the cost of measures taken in connection with the manufacture, supply and distribution of salt by Union agencies and the regulation and control of the manufacture, supply and the distribution of salt by other agencies and in particular measures for:

(i) the establishment and maintenance of research stations and model salt farms;
(ii) the establishment, maintenance and expansion of salt factories;
(iii) fixing the grades of salt;
(iv) promoting and encouraging co-operative efforts among manufacturers of salt; and
(v) promoting the welfare of labourers empolyed in the salt industry.

The Act also empowers the Central Government to make rules for carrying out the purposes mentioned therein including granting of exemptions from the levy of cess in respect of salt:

(i) exported from India;

(ii) manufactured by specified categories of manufacturers; and

(iii) utilised in the manufacture of any other product of industry.

The Government of India notified that all salt falling under the following categories should be wholly exempted from the cess leviable under Section 3 of the said Act:

(i) salt exported by sea from India;

(ii) salt manufactured by an individual or group of individuals in cases where the total area of the land from which salt is so manufactured does not exceed ten acres.

Recently, the Government of India notified that all salt manufactured in the private factories in cases where the total area of the land from which salt is so manufactured exceeds 10 acres, but does not exceed 100 acres, shall be exempted from one half of the cess leviable under Section 3 of the Salt Cess Act, 1953.

As regards allowing rebate of cess on salt consumed by heavy chemical industries, the Salt Advisory Committee at its meeting held on December 10, 1954, came to the decision that no rebate could be given.

(3) *Recovery of by-products.*—It has been arranged that the Director, Central Salt Research Station, Bhavnagar, should undertake the following items of work before the recovery of by-products is made compulsory for the salt licencees:—

(a) investigations as to which by-product can be recovered by various salt works in the country;

(b) standardisation of methods for the recovery of these by-products and suggestions regarding the equipment required with estimates of expenditure;

(c) estimates of the probable cost of such recovery with a view to finding out whether these products can be recovered on a commercial basis by various salt works.

Some experiments have, so far, been conducted and a process for the separation of sodium sulphate from bitterns has been evolved. A pilot plant project for the manufacture of sodium sulphate from the Sambhar lake is included in the Second Plan of Rajasthan. An experiment for the removal of pink colour and foul smell from the bitterns has also been conducted and a process evolved. Field experiments on these two problems are yet to be undertaken.

(4) *Maintaining of stocks through reserves.*—The Plan recommended that the system by which stocks of salt were expected to be maintained through reserves should be retained and enforced; and relaxed only when production became considerably in excess of the total requirements.

The Commodity Controls Committee recommended that the Salt (Reserve Stock) Order, 1950, should be retained, but suggested that in view of the easy position obtaining in the country in regard to the production of salt, a reduction to 12 lakh maunds from 17 lakh maunds of the stock of salt at the Government *golahs* at Calcutta should be feasible. As regards the percentage of salt to be stored by the importers in the *golahs*, the Committee recommended that the Salt Commissioner might be empowered to vary the percentage between 5 and 15. These recommendations have been accepted by the Government. The present percentage as provided in Clause 3 of the Salt Reserve Stock Order is 7½.

(5) *Nominee system of salt distribution.*—The Commodity Controls Committee recommended that the 'nominee system' of salt distribution had outlived its utility, but since the States where the nominee system was prevailing were generally opposed to its removal, those States should be asked to allow 'free' imports also, *i.e.*, traders other than the nominees should be allowed to take salt into the States in addition to the nominees.

The Central Government reviewed the system in 1955 and in view of the then existing surplus it was considered that there was no need for any sort of control on the procurement or distribution of salt within any States. Some of the States advocated the continuance of the nominee system. The State Governments, however, were requested to form salt co-operative societies in each district centre or for bigger areas for the procurement and distribution of salt within the States and to abolish the nominee system altogether as early as possible. As a result, many States, *viz.* Punjab, Bihar, Ajmer, Himachal Pradesh, PEPSU, Rajasthan, Delhi, Madhya Pradesh, Bombay, etc., have either completely or partially abolished the nominee system. This system is at present in force mainly in respect of supplies from the Government salt works. Supplies from the private sector are practically free from control of any kind.

(6) *Development of salt works.*—As regards the development of existing salt works in Rajasthan and Saurashtra, the First Plan envisaged an expenditure of Rs. 50 lakhs, but the actual expenditure incurred has not exceeded Rs. 30 lakhs. The balance will have to be carried over to the Second Plan.

The scheme for the development of the Mandi rock salt mines involving an outlay of Rs. 1 crore was included in the First Plan. The Geological Survey of India were requested to explore the possiblities of development, but owing to want of equipment, they suggested that the Associated Drilling and Supply Co., a British firm, should undertake the work. The drilling was started by the firm in 1952, and enough reserves of salt to last for ten years based on annual production of 66,000 tons of refined salt have been proved. But under expert advice, further core drilling of deeper strata has been undertaken before a decision is taken on whether the wet mining scheme of Escher Wyss, the Swiss firm, is to be taken up. No expenditure, so far, has been incurred on this scheme. The small expenditure incurred on core drilling, was met from the provision sanctioned for the Development of Existing Salt Works.

The Salt Department has set up a small iodisation plant at Sambhar in collaboration with the Ministry of Health for the manufacture of iodised and iodated salt for supply to the goitre affected areas in the Himalayan region, and it is expected that this plant will start operation during the Second Plan.

II. Programme of Development in the Second Plan

Estimated requirements.—It is assumed that the *per capita* household consumption of salt in 1960-61 will be 14 lbs. per annum, which is the current level, for a population of 408 millions. In view of the rapid industrialisation programme envisaged under the Second Plan, it is anticipated that the consumption of salt in the chemical and related industries will increase considerably. Further, efforts are being made to expand considerably the export of salt. Based on the above assumptions and facts, it is estimated that the total demand for salt by 1960-61 will be of the order of 100 million maunds. The break-up of this anticipated demand is given below:—

	(Million maunds)
Domestic consumption	70.0
Industries	20.0
Exports	8.0
Provision for unforeseen requirements	2.0
	100.0

Target of production.—The production target set for salt for 1960-61 is 100 million maunds so as to meet the requirements in full.

Development programme of existing salt works.—A provision of Rs. 189 lakhs has been made for the development of existing salt works in the Second Plan. Out of this, about Rs. 122·3 lakhs will be spent by the Government on the improvement of the Government maintained salt factories in which private manufacturers produce their salt. This investment will be utilised for:

(a) the expansion of production so as to achieve the production target of 100 million maunds in 1960-61 as against 83·7 million maunds fixed for 1955-56;

(b) keeping the existing works in working condition and improving their performance; and

(c) improving the quality of salt. The intention is that the sodium chloride content of salt should be raised from 94 per cent to a minimum of 96 per cent, if not 97 per cent, in the course of the next five years. As regards the comparative volume of production of the improved variety of salt, it is estimated that about 80 per cent of the production in 1960-61 would be of the higher standard mentioned above. The details of the development programme of the existing salt works in the Second Plan are as given below:—

(1) Establishment of 20 test laboratories—14 in the Madras region, 2 in the Bombay region, 3 in the Calcutta region and 1 in the Rajputana Salt Sources (R.S.S.) Division.

(2) Establishment of model farms according to the schedule given below:—

1956-57	1957-58	1958-59
Madras Circle	Naupada Circle Cuddalore „ Nagercoil „	Shiroda

(3) Development of works and improvement of brine supply.

(4) Improvement of water supply.

(5) Improvement of plant and machinery.

(6) Better amenities for staff and for labour.

(7) Improved medical and educational facilities.

The sector-wise break-up of the total outlay on the development of the existing salt works under the Second Plan is given below:—

Private sector	(Rs. lakhs)
Madras Region	59·1
Bombay Region	53·3
Calcutta Region	9·9
TOTAL	122·3
Public sector	
R. S. S. Division	47.8
Kharaghoda	8.2
Mandi	11.0
TOTAL	67.0
GRAND TOTAL	189.3

Scheme for the development of Mandi salt mines—The Mandi salt mines are, since partition, the only source of rock salt in India. This rock salt, however, contains a large quantity of impurities like stone and earth. The proposal is that ultimately the wet mining of salt should be undertaken at these mines; but, for the present, it is intended to sink two shafts for dry mining of salt on scientific lines. The main scheme will be taken up later on after reserves have been more fully proved. The cost of sinking two shafts has been estimated to be Rs. 8 lakhs out of which Rs. 3 lakhs will be required during 1956-57 and Rs. 5 lakhs during 1957-58. The total cost of the scheme is estimated to be Rs. 1 crore.

The table below summarises the programme of development of the salt industry during the Second Plan period:—

	Unit	1955-56	1956-61
Production	(Million maunds)	84·0	100·0

47. SUGAR

I. Review of Progress in the First Plan

Targets.—The Planning Commission estimated the requirements of white sugar in the country by 1955-56 at 1·5 million tons per annum. The rated capacity of the industry in 1950-51 of 1·54 million tons of sugar per annum* was considered sufficient to meet the demand provided measures were taken to utilise the idle capacity by shifting unfavourably located factories to more suitable sites, to expand uneconomic units, and to increase the supply of sugarcane to factories so as to raise the average number of working days from 100 to 120. It was visualised that no new factories need be established during the period of the Plan for meeting the estimated requirements.

Capacity and production.—Little change took place in the capacity of the industry during the first four years of the Plan. In 1951 there were 158 sugar factories with a rated capacity of 1·54 million tons of sugar per annum. In April 1956 there were 147 sugar factories registered under the Industries (Development and Regulation) Act, 1951 with an annual capacity of about 1·69 million tons of sugar. In addition, there were 13 factories which had been lying idle for the last several years. Their capacity was about 51,000 tons per annum. Thus there were 160 sugar factories with an annual capacity of about 1·74 million tons (equivalent to about 145,000 tons of sugarcane crushed per day). Of these, 143 with a rated capacity of about 1·68 million tons of sugar per annum worked during the 1955-56 season.

The State-wise distribution of sugar factories at the end of the First Plan is given below:—

State	Sugar factories existing in 1955-56		Sugar factories working in 1955-56	
	Number	Total capacity (tons of sugarcane crushed per day)	Number	Total capacity (tons of sugarcane crushed per day)
Uttar Pradesh	73	74,412	68	72,362
Bihar	30	28,636	28	27,836
Bombay	16	13,150	15	12,950
Andhra	10	6,275	8	5,850
Madras	6	4,590	4	4,440
Madhya Bharat	5	2,500	4	2,150
PEPSU	3	2,250	3	2,250
Hyderabad	2	3,420	2	3,420
Mysore	2	2,000	2	2,000
West Bengal	2	1,550	1	800
Rajasthan	2	1,100	2	1,100
Orissa	2	350	1	250
Punjab	1	2,250	1	2,250
Travancore-Cochin	1	500	1	500
Saurashtra	1	400	1	400
Vindhya Pradesh	1	100	..	..
Assam	1	50	..	..
Chief Commissioners' States	2	1,450	2	1,450
TOTAL	160	144,983	143	140,008

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* Calculated on the basis of an average working season of 120 days and sugar recovery of 10 per cent.

The number of working factories and the production of sugar during 1950-51 and during the five years of the Plan were as under:—

Year (November-October)	Number of working factories	Sugar produced ('000 tons)
1950-51	139	1,116
1951-52	140	1,497
1952-53	135	1,297
1953-54	135	1,001
1954-55	137	1,590
1955-56	143	1,820 (Estimated)

Consumption.—With the withdrawal of control over sugar towards the end of 1952, consumption began to rise steeply and soon exceeded the original estimate of 1·5 million tons for the last year of the Plan. The annual consumption during the Plan period was as under:—

Year (November—October)	(Million tons)
1951-52	1·17
1952-53	1·66
1953-54	1·81
1954-55	1·72
1955-56	1·90 (Estimated)

Imports and exports.—To bridge the wide gap between demand and production, large quantities of sugar had to be imported during 1953-55 as shown by the following data relating to foreign trade:—

Year (November—October)	Imports ('000 tons)	Exports ('000 tons)
1951-52	..	11
1952-53	59	7
1953-54	716	..
1954-55	568	..

Because of the adequate opening stocks of sugar on November 1, 1955 (0·542 million tons) and the bumper sugarcane crop, the Government decided not to purchase any more sugar for import during 1955-56.

Additional capacity licensed.—In view of the changed situation following decontrol, the policy of restricted development decided upon at the commencement of the Plan was reviewed early in 1954. It was decided to license additional capacity freely so as to raise the total capacity of the industry to not less than 2·0 million tons which, it was presumed, would be sufficient to give a production of 1·8 million tons of sugar per annum for meeting fully the requirements of the country under conditions of decontrol. Accordingly, licences were issued for 43 new sugar factories and for the substantial expansion of 42 existing units. The total additional capacity approved for installation up to the end of March 1956 amounted to about 0·725 million tons in terms of sugar. Out of this capacity about 0·085 million tons went into production during 1955-56. Capacity of about 0·22 million tons is expected to come up in 1956-57, 0·25 million tons in 1957-58 and the balance in the following years. In sanctioning additional capacity special attention was given to the establishment of new factories in the peninsula of India. The State-wise distribution of the additional capacity licensed is given below:—

	New factories	Substantial expansions	Additional capacity licensed ('000 tons of sugar)
Andhra	4	4	71
Assam	2	..	16
Bihar	..	3	12
Bombay	17	7	228
Hyderabad	2	1	25
Madras	7	..	73
Mysore	4	1	43
Orissa	..	1	4
PEPSU	..	1	4
Punjab	3	1	55
Uttar Pradesh	2	22	175
West Bengal	2	1	20
TOTAL	43	42	726

A special feature of the additional capacity licensed is the large number of cane growers' co-operative sugar factories envisaged thereunder. As compared to a couple of such factories now existing, 22 of the 43 new factories licensed will be co-operative enterprises—14 in Bombay State, 3 in the Punjab, 2 in Mysore and 1 each in Uttar Pradesh, Madras and Assam. These factories are expected to be set up partly with share capital raised by cane growers and partly with assistance given by the State Governments and the Industrial Finance Corporation of India.

Size of factories.—The crushing capacity of sugar factories operating in the country varies from 220 tons to 3,200 tons of sugarcane per day. Under present day working conditions a factory with a crushing capacity of 700-800 tons of sugarcane per day is considered to be an economic unit. During the First Plan period three uneconomic units expanded their capacity to 700 tons and above. Of the 143 sugar factories (excluding the experimental sugar factory at Kanpur having a capacity of only 37 tons of sugarcane per day) which worked during 1955-56, 31 factories had capacities below 700 tons. Nine of these have been granted licences for raising their capacity above 700 tons. A majority of the sugar factories which remained idle during 1955-56 have a capacity below the economic level.

Investment.—It is roughly estimated that the capital expenditure incurred by the sugar industry during the First Plan period was as follows:—

	(Rs. crores)
(i) Normal repairs, minor additions, modernisation and change in process, etc.	10
(ii) New units and substantial expansion of existing factories (which started production during the First Plan period)	5
TOTAL	15

Price of sugarcane and its effect on the sugar industry.—The minimum price payable for sugarcane delivered to sugar factories is fixed by the Central Government from year to year. The prices fixed for the last six years are given below:—

	Price per maund (gate delivery) Rs. As.
1950-51	1 12
1951-52	1 12
1952-53	1 5
1953-54	1 7
1954-55	1 7
1955-56	1 7

Alterations in the price of cane cause fluctuations in its availability to the sugar factories since the price would determine (i) whether it is preferable to grow other crops rather than sugarcane, and (ii) whether it is preferable to turn sugarcane into *gur* rather than to sell it to factories. Data relating to the production of sugarcane and its consumption by sugar factories from 1950-51 onwards are given below:—

	Production of sugarcane ('000 tons)	Quantity crushed by sugar factories ('000 tons)	Percentage of the total production crushed by factories
1950-51	56,160	11,016	19·6
1951-52	60,680	15,496	25·5
1952-53	50,190	13,025	26·0
1953-54	43,870	9,933	22·6
1954-55	54,650	16,011	29·3
1955-56	50,282 (Second estimate)	N. A.	N. A.

Payment for sugarcane on quality basis.—The present system of paying for sugarcane on the basis of its weight provides no incentive to the cultivator to improve agricultural practices so as to grow high sugar-yielding varieties of cane and to harvest cane when it is fully mature. It also provides no incentive to the less efficient factories to improve their working so as to raise the recovery of sugar. Introduction of a suitable system in India for making payment for sugarcane on the basis of its sugar content is, therefore, highly desirable.

A question connected with the payment for sugarcane is that of passing on to the cultivator a legitimate share of the price for sugar realised by the factories. A formula for sharing this price was drawn up in 1952-53 by the South India Sugar Mills Association with the agreement of the cane growers concerned. A modified formula was worked out by the Ministry of Food and Agriculture for application to the entire industry during the 1953-54 season. While the principles underlying this formula have been generally accepted, the representatives of the cane growers have complained that their percentage share of the price is low. The manufacturers, on the other hand, feel that the depreciation and replacement allowance in the formula is inadequate and does not take full account of the present day cost of machinery and spare parts. The Government of India have appointed an Expert Committee to examine the formula as well as the question of payment for sugarcane on quality basis.

Development Council for the Sugar Industry.—A Development Council was set up for the sugar industry in March 1954 under the Industries (Development and Regulation) Act, 1951.

Action on major recommendations.—(i) It was recommended that sugar factories at present located in areas where sufficient cane supply is not available should be enabled to shift to better locations and that an Expert Committee should go into this matter. So far only two unsuitably located factories have shifted, *viz.*, factories at Hamira (PEPSU) and Kichna (U. P.) have shifted to Iqbalpur (U. P.) and Bulandshahr (U. P.) respectively. There were also two idle plants at Ranbirsinghpura (Jammu & Kashmir) and Shreepur (Bombay) which have recently been shifted to Dhuri (PEPSU) and Hamira* (PEPSU) respectively.

In August 1954 the Development Council for the Sugar Industry appointed an Expert Committee to examine this matter. The Committee examined the cases of 25 factories which claimed to be unsuitably located but found that in most cases it is more economic to spend money on the development of sugarcane in the areas where these factories are at present located than to shift them elsewhere, and accordingly recommended the shifting of only four factories.

(ii) It was recommended that the State Governments should arrange to utilise the entire cane cess collected by them for the purpose of cane development. The statistics given below indicate the yield from the cess and expenditure on cane development in Uttar Pradesh and Bihar:—

State	Year	Total income from cess (Rs. lakhs)	Total expenditure on cane development schemes (Rs. lakhs)
Uttar Pradesh	1951-52	3,23·00	37·38
	1952-53	3,15·37	44·22
	1953-54	5,16·16	38·42
	1954-55	3,55·89	41·22
	1955-56	3,50·0(a)	47·90(a)
Bihar	1951-52	1,02·86	59·32
	1952-53	1,15·37	90·75
	1953-54	1,24·84	81·53
	1954-55	85·45	68·56
	1955-56	1,56·06(a)	1,05·93(a)

(a) Revised estimates

(iii) In order to overcome the shortage of sulphur prevalent during the early years of the Plan, it was recommended that the carbonatation process (instead of the sulphitation process) should be preferred for the clarification of cane juice consistent with the availability of limestone supplies in adequate quantities. During the First Plan period 10 sulphitation factories changed over to the carbonatation process. This shift is, however, attributed primarily to the change in consumer's preference for whiter sugar of bolder grain.

II. Programme of Development in the Second Plan

Estimated requirements and targets of capacity and production.—The Development Council for the Sugar Industry estimated that in 1953-54 a population of 375 millions in India consumed 4·82 million tons† of *gur*, *khandsari* and sugar. This is equivalent to a per adult consumption of about 1·47 oz. per day. Sugar accounted for 1·81 million tons or about 38 per cent of the total consumption. On this basis the Council estimated that the anticipated population of 410 millions in 1961 will consume 5·27 million tons of the three sweetening agents. Allowing for an annual shift in consumption of about 37,000 tons per annum from *gur* and *khandsari* to sugar, they concluded that the demand for sugar in 1960-61 would be about 2·25 million tons and that for achieving a production of this order, the installed capacity of the industry should be raised to about 2·5 million tons.

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* The original factory at Hamira was too large for the area. The plant now installed there is of smaller size.

† A later and revised estimate by the Directorate of Economics and Statistics, Ministry of Food and Agriculture puts the figure at only 4·5 million tons, which brings down the per adult consumption of the three sweetening agents to about 1·37 oz. per day.

These estimates of consumption appear to be somewhat conservative. The likely shift from *gur* and *khandsari* to sugar is difficult to forecast—consumption trends during the First Plan period afford little guidance since they were affected first by control and later by its withdrawal—and the Development Council's estimate is perhaps as good as any other. But the Council has based its calculations on the assumption that the consumption of the three sweetening agents will only increase *pari passu* with the growth of population, and this seems to be a doubtful assumption. The general rise in purchasing power and in the standard of living of the people envisaged in the Second Plan will be almost sure to lead to increased *per capita* consumption of these commodities. Moreover, the Agricultural Plan aims at a production of 71 million tons of sugarcane per annum (7·1 million tons in terms of *gur*) by 1960-61 which would, if achieved, after deduction of 15-16 per cent used for chewing and planting purposes, yield about 6 million tons of *gur*, *khandsari* and sugar as against only 5·27 million tons assumed by the Council. A total consumption of 6 million tons in 1960-61 would mean a consumption by every adult of about 1·68 oz. per day. This is not a high level—nutritional experts regard 2 oz. per day as the desirable minimum—nor does it represent any very great advance over present consumption. Since the date when the Development Council framed its estimates, the figures for 1954-55 have become available and these show that the total consumption of *gur*, *khandsari* and sugar in that year amounted to about 4·69 million tons, which is equivalent to a consumption by every adult of about 1·41 oz. a day. A rise to 1·68 oz. by 1960-61 would mean an increase of about 28 per cent during the course of six years. An increase of this order is well within the bounds of possiblity. Of the total consumption of 4·69 million tons in 1954-55, sugar accounted for 1·72 million tons or 37 per cent. Assuming that the percentage remains the same and there is no shift from *gur* and *khandsari* to sugar, the consumption of sugar in 1960-61 on the basis of a total consumption of 6 million tons of all three sweetening agents, would be 2·2 million tons. But a continuous shift towards sugar will almost certainly accompany a rise in the standard of living. If the shift is of the order of 37,000 tons per annum as estimated by the Development Council then the demand for sugar in 1960-61 would be 2·42 million tons or 40 per cent of the total consumption of the three sweetening agents.

These calculations indicate that five years hence the consumption of sugar might reach a level of around 2·5 million tons and possibly even go beyond it.

For the present the targets of capacity and production recommended by the Development Council have been accepted but in view of the considerations set forth in the foregoing paragraphs, these will have to be kept under constant review and revised, if necessary, from time to time.

Additional capacity required.—As already stated, the capacity of the sugar industry stood at 1·74 million tons in April 1956. When the capacity of 0·64 million tons which has already been licensed is installed, the capacity of the industry will be about 2·38 million tons per annum. The Planning Commission have approved in principle the establishment of 35 co-operative sugar factories on the basis of proposals put forward by various State Governments for inclusion in the Second Plan. Two of these have already been licensed. The remaining 33 factories are expected to add a capacity of another 0·33 million tons raising the total capacity of the industry to about 2·71 million tons (or about 2·66 million tons if we leave out the capacity of about 0·05 million tons which has been lying idle for the last several years).

In regard to the licensing of additional capacity it has been decided that expansion to existing factories should generally be allowed provided enough sugarcane is available in the factory area and that in the case of new factories, preference should be given to growers' co-operatives, particularly those which are sponsored by the State Governments in accordance with their approved development programmes. Nevertheless, the licensing policy should remain open and every application, whether co-operative or private, should be examined on its merits. Licences for new factories should, however, be granted only when it is known that sufficient supplies of sugarcane are already available or are expected to be available within a reasonable period around the proposed sites. In this, preference should be given to States in which there has been no or inadequate development of the sugar industry or in regions such as the Tarai area in Uttar Pradesh where the sugarcane grown cannot be utilised for any other purpose.

Investment and employment.—The investment required for establishing additional capacity of about 0·76 million tons to achieve the capacity target of 2·5 million tons during the Second Plan period is roughly estimated at Rs. 50 crores.

The replacement of old and worn out machinery in a majority of the existing sugar factories is long overdue. A major part of this machinery was purchased about twenty years ago. During the Second World War and the period immediately following, even normal replacements could not be carried out as the parts were not easily available. The prices of sugar machinery are still high and substantially large funds are needed to carry out replacements on any significant scale.

The heat economy of several of the existing factories is not properly balanced; as a result, they not only burn their entire production of bagasse for raising steam for processing sugar and for generating power but also consume appreciable quantities of extra fuel in the form of coal and firewood. Improvement in this matter, apart from securing a reduction in the cost of production of sugar, would also help releasing surplus bagasse for establishing subsidiary industries and relieving the country's transport system of the strain of carrying extra fuel to the factories. There is, therefore, an urgent need to undertake measures for improving the heat balance of the factories. In this connection conversion of plants from steam drive to electric operation needs encouragement.

The cost of replacing old machinery and modernising existing factories is estimated at about Rs. 50 crores. It would be desirable to expand uneconomic units to an economic level at the time of replacement of the machinery provided increased sugarcane supplies can be made available in each case.

The establishment of additional capacity of about 0·76 million tons of sugar during the Second Plan is expected to provide employment to about 30,000 persons.

Requirements of raw materials.—The sugar industry will require the following quantities of the principal raw materials for achieving a production of 2·25 million tons of sugar in 1960-61.

Sugarcane	22·5	Million tons
Limestone and lime	235,000	tons (expressed as limestone).
Coal	220,000	tons
Coke	16,000	,,
Sulphur	14,000	,,

The table below summarises the development programme for the sugar industry in the Second Plan:—

	1955-56	1960-61
Capacity (Million tons)	1·74	2·50
Production (,,)	1·82 (Estimated)	2·25

48. VEGETABLE OILS

I. Review of Progress in the First Plan

Targets.—The programme of development for the vegetable oil industry in the First Plan had the following objectives and targets:

(i) Non-expansion of capacity of large-scale oil mills and formulation of common production programmes for these and the *ghanis;*

(ii) Increase by 2 per cent in the efficiency of the extraction of oils by *ghanis* assumed at 35-36 per cent at the commencement of the Plan through adoption of improved techniques and models of *ghanis;*

(iii) Production of 7·6 lakh tons of oil by large-scale mills and 5·1 lakh tons by *ghanis* by 1955-56 as against corresponding figures of 7·6 lakh tons and 3·5 lakh tons in 1949-50;

(iv) Expansion of the cottonseed oil industry which was envisaged, as a minimum at an extra production of 7,500 tons of oil based on the requirements of cotton linters for the rayon industry;

(v) Introduction of solvent extraction processes to secure higher overall recovery of oils, the maximum capacity of the plants to be established during the period of the Plan being envisaged at treating 200,000 tons of cake per year (or production of 15,000 tons of oil);

(vi) An additional demand of 100,000 tons for vegetable oils owing to the larger requirements of the soap, paints and varnishes and other industries excluding vanaspati;

(vii) Export target of 170,000 tons of oil; and

(viii) Wider utilisation of neglected resources of oil-bearing materials like *neem, mahua, karang* and *maroti.* No specific targets were laid down in regard to the extraction of oil from these sources.

The progress actually achieved by the industry as against the targets set in the Plan is indicated in the following paragraphs.

Capacity.—In 1951 there were about 174 large-scale oil mills on the active list of the Development Wing of the Ministry of Commerce and Industry engaged in the production of edible oils with an annual rated capacity of about 580,000 tons of oil on a single shift basis. During the period under review, no new large-scale units or substantial expansion of existing large-scale mills for the crushing of oilseeds (except cottonseed) came into existence on account of the policy of the Government not to encourage the setting up of new mills or permit expansions of large-scale units in view of the surplus oil milling capacity in the country.

According to the Development Wing there are at present 2,097 oil mills registered under the Factories Act. The total number of power-driven mills in existence in the country is estimated at 3,200. The State-wise distribution of the 2,097 oil mills registered under the Factories Act is as follows:—

Assam	73
Bihar	92
Bombay	375
Madhya Pradesh	101
Madras & Andhra	540
Orissa	7
Punjab	39
Uttar Pradesh	125

West Bengal	66
Hyderabad	298
Madhya Bharat	101
Mysore	23
PEPSU	12
Rajasthan	29
Saurashtra	120
Travancore-Cochin	56
Part C States	40
TOTAL	2,097

Out of this total only about 230 units have been registerd under the Industries (Development and Regulation) Act, 1951.

The total crushing capacity of the mills in the country is estimated at 56 lakh tons per annum in terms of oilseeds. According to the Oil Expert to the Uttar Pradesh Government there are about 4 lakh village *ghanis* in India with an annual crushing capacity of about 7 lakh tons of oilseeds. Thus the total crushing capacity in India is estimated at 63 lakh tons in terms of oilseeds; the total output of oilseeds during recent years is estimated at only 50 to 55 lakh tons and therefore an appreciable part of the available capacity for oil production has remained idle.

Production.—The actual production of oil from the five major oilseeds has been estimated as follows:—

Oil	1950-51 ('000 tons)	1951-52 ('000 tons)	1952-53 ('000 tons)	1953-54 ('000 tons)	1954-55 ('000 tons)
Groundnut	748	662	628	847	938
Castor	7	37	36	37	39
Sesamum	136	135	140	165	184
Rape & mustard	221	275	247	246	291
Linseed	83	89	103	103	114
TOTAL	1,195	1,198	1,154	1,398	1,566

The production in 1953-54 and 1954-55 has exceeded the overall target of 1,272,000 tons of oil set for 1955-56.

There are no data available to indicate the relative shares of large-scale mills and *ghanis* in the total ouput of vegetable oils and the actual progress made by the latter *vis-a-vis* targets (ii) and (iii) mentioned in the first paragraph. In recent years, however, an attempt has been made to improve the efficiency of the *ghanis* and several models of improved *ghani* such as the Wardha *ghani*, Nutan *ghani* and Pinto Cheku *ghani*, have been introduced.

The percentage recovery of oil from the oilseeds crushed by different types of equipment and the percentage of residual oil content in cakes from different pressing units are as follows:—

Pressing unit	Approximate recovery (per cent)
1. Ordinary teli *kohlu* driven by bullocks	35
2. Improved Wardha *kohlu* driven by bullocks	40
3. Bengal type power driven *ghani*	42
4. Bombay type power driven *ghani*	42
5. Expellers	45
6. Hydraulic press	44 to 45

Pressing unit	Residual oil content (per cent) Linseed cake	Residual oil content (per cent) Mustard cake	Residual oil content (per cent) *Til* cake
1. Ordinary *teli kohlu* driven by bullocks	14.15	15.16	14.15
2. Improved Wardha *kohlu* driven by bullocks	12.58	11.20	12.54
3. Bengal type power driven *ghani*	11	10.5 to 11	11 to 12
4. Bombay type power driven *ghani*	11	10.5	11
5. Expellers	7.75	8	9
6. Anglo-American or cage type hydraulic presses	8.9	9	8

The improved types of *ghani* introduced in recent years have reduced to a considerable extent the difference in the percentage recovery of oil from *ghanis* and mills. But the total number of improved *ghanis* introduced so far is relatively very small. In recent years the Indian Central Oilseeds Committee has been financing the replacement of old traditional *ghanis* by improved models and has been able to introduce nearly 4,000 Wardha *ghanis*. The more important among the States which have introduced these *ghanis* are Bihar (225), Orissa (65), Uttar Pradesh (1,430), Punjab (8) and Bombay (10). In addition, the All India Khadi and Village Industries Board has also introduced a large number of Wardha *ghanis*.

Development of cottonseed oil industry.—It was recommended in the First Plan that encouragement should be given to the expansion of the cottonseed oil industry by the establishment of a few new plants capable of producing a minimum of 7,500 tons of oil and simultaneously 5 million lbs. of cotton linters. Since the Industries (Development and Regulation) Act, 1951, came into force, the following 8 firms have been granted licences for setting up vegetable oil mills on the condition that they will crush cottonseed only.

Name of the firm	Annual capacity in terms of cottonseed (Tons)
(i) Sundatta Cottonseed Utilisation, Bombay (Factory at Hubli)	9,000
(ii) Indian Cotton Oil Mills, Navsari	7,200
(iii) Viswa Traders, Badnera	7,200
(iv) Mansinghka Oil Mills, Khandwa	30,000
(v) Hanuman Oil Mills, Khamgaon	2,800
(vi) B. Kishenlal Oil Mills, Hyderabad	9,000
(vii) Akola Oil Mills, Akola	9,000
(viii) Purshotam Das Nathabhai & Sons, Kapadwanj, Kaira	9,000

In addition the Madhya Bharat Government have under the Second Plan, a proposal for installing a plant with a crushing capacity of 15,000 tons of cottonseed per annum. The total installed capacity of the 9 units mentioned above is estimated at 98,200 tons per annum in terms of seed. All these units are to be equipped with delinting and hulling machines. Apart from these mills, the crushing of cottonseed is carried on along with other seeds by a large number of mills.

As against the target of an additional 7,500 tons of cottonseed oil envisaged under the Plan, the production of cottonseed oil is estimated to be about 9,000 tons in 1955-56 compared to about 5,000 tons at the commencement of the Plan.

Solvent extraction of oilcakes.—In view of the limited supplies of the principal oilseeds from which oil can be produced and the prevalent shortage of oils, it was considered necessary to encourage the oil milling industry to introduce solvent extraction techniques with a view to achieving an increased yield of oil from a given quantity of oilseeds.

It was recommended in the Plan that, pending the results of investigations by the Indian Veterinary Research Institute regarding the suitability of de-oiled cakes as cattle feed, solvent extraction plants should be allowed to be established up to a maximum capacity of 200,000 tons of cake per year (equivalent to 15,000 tons of oil) on the condition that the solvent extracted cake would be used for fertilizer purposes only. The Ministry of Food and Agriculture at first agreed, on an experimental basis, to the installation of solvent extraction plants for the extraction of residual oil from oilcakes up to an aggregate capacity of 200,000 tons of oilcakes per year. Under the influence of the high prices which obtained for vegetable oils in 1953, great interest was shown by private enterprise in the installation of solvent extraction plants. By the end of 1954, the capacity of 200,000 tons of cake per year had been licensed. It was subsequently agreed by the Ministry of Food and Agriculture to permit a further capacity of 200,000 tons of oilcakes per annum for solvent extraction. By the end of March 1956 a capacity of 340,000 tons of oilcakes had been licensed making with the capacity of 60,000 tons established before the industry came under statutory control, a total of 400,000 tons per year. After taking into consideration the permissions given subsequently and the revocation of licences pending issue, the State-wise distribution of the capacity at the end of May 1956 was approximately as follows:—

State	Annual capacity (Tons)
Bombay	121,500
Uttar Pradesh	21,000
West Bengal	6,000
Andhra	9,000
Madras	15,000
Saurashtra	124,500
Hyderabad	58,500
Madhya Bharat	21,000
Travancore-Cochin	15,000
TOTAL	391,500

The current production of oil by the technique of solvent extraction of oilcakes is estimated at about 7,000 tons per annum.

Estimated consumption.—The production and utilisation of important vegetable oils (including also *kardi*, *niger*, cottonseed and coconut) in 1954-55 are estimated to have been as under:—

	('000 tons of oil)
(i) *Total production*	1,760
(ii) *Utilisation*—	
(a) For edible uses	1,139
(b) For vanaspati manufacture	259
(c) For industrial purposes (soap, paints and varnishes, lubrication and miscellaneous uses)	224
(d) Exports	138
TOTAL	1,760

Imports.—The indigenous output of coconut oil being insufficient to meet the internal requirements, sizeable quantities had to be imported from abroad. The bulk of the imports came from Ceylon, Singapore and Malaya. Minor quantities of linseed and other sorts of oil were also imported. The imports of coconut oil were as follows:—

Year	Q[illegible]tity ('00[illegible]tons)	Value (Rs. lakhs)
1950-51	17·8	3,17·2
1951-52	30·6	6,03·6
1952-53	20·3	3,08·2
1953-54	23·2	3,89·9
1954-55	22·9	3,58·3
1955-56 (Ten months, April to January)	20·5	2,59·8

Exports.— India is one of the most important producers of oilseeds and is consequently a large producer of vegetable oils. It is also a major exporter of oils. In order to encourage the export of vegetable oils in preference to oilseeds, the export duty on various oils was progressively reduced or abolished whereas that on oilseeds was kept more or less steady throughout the period under review.

The main categories of vegetable oils exported are groundnut oil, castor oil, linseed oil and rape and mustard oil. Minor quantities of *mahua*, *salad*, sesamum and other varieties of oil are also exported. The bulk of the castor oil is absorbed by the U. S. A., the United Kingdom and Australia. Groundnut oil is exported mainly to the United Kingdom, Netherlands, Belgium, Italy and Burma, while linseed oil goes mainly to the United Kingdom, Netherlands and Australia. Oilcakes are exported in small quantities. Small quantities of seeds are also being exported, groundnut being the main item of export.

The quantity and value of vegetable oils of all categories exported during the Plan period have been as follows:—

(Quantity in thousand tons and value in Rs. lakhs)

Year	Castor oil		Groundnut oil		Linseed oil		Rape and Mustard oil		Other sorts		Total exports	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
1950-51	24·2	4,35·0	83·1	16,73·9	5·7	1,09·6	·12	2·9	6·4	96·8	1,19·5	23,18·1
1951-52	23·5	6,57·1	20·2	4,31·7	25·1	5,66·3	·15	4·5	19·4	4,05·9	88·3	20,65·5
1952-53	37·4	7,64·3	68·3	10,47·1	28·3	468·2	·44	8·6	9·0	1,09·1	143·3	23,97·3
1953-54	19·2	3,18·6	1·5	24·7	3·6	52·5	·33	7·4	7·0	83·1	31·6	4,86·3
1954-55	29·8	3,49·8	91·9	11,88·0	9·8	1,12·6	·47	8·9	20·3	2,38·4	152·2	18,97·7
1955-56 (Ten months, April to January).	34·5	3,52·4	107·9	13,07·4	65·3	6,95·6	·68	11·0	35·2	4,10·8	243·7	27,77·2

Due to a fall in production of oilseeds in 1952-53, vegetable oils were in short supply in the subsequent year, which resulted in a sharp fall in exports of oils during 1953-54. As is evident from the figures given in the above table the export target of 170,000 tons of oil set for 1955-56 in the Plan has been exceeded by a comfortable margin in 1955-56.

Prices of vegetable oils—The broad trend of the prices of vegetable oils during the period under review, in spite of minor spurts now and then, has been in the direction of a progressive decline from the high levels of 1951 and the earlier period.

Raw materials.—The most important oilseeds consumed in large quantities for the production of oils are groundnut, linseed, rape and mustard, castor and sesamum seed. Small quantities of cottonseed are also crushed for the production of oil. Depending upon local supplies, the village *ghanis* also produce small quantities of *neem* and other oils but the quantity of minor oilseeds crushed in the country is not large.

Capital and labour.—According to the Census of Manufactures, 1952 the capital invested in 1,955 registered factories in 1952 was as follows:—

	(Rs. lakhs)
Land	96·1
Buildings	4,02·1
Plant and machinery	6,82·8
Other fixed assets	57·0
Total fixed capital	12,38·0
capital	11,94·9
Total productive capital	24,32·9

The number of persons employed in these factories was 43,580. According to the 1951 Census, about 193,000 self-supporting persons were employed in oil pressing and refining and, allowing for the number engaged in oil mills and expellers, the number of those engaged in the *ghani* industry may be placed at about 150,000.

COCONUT OIL INDUSTRY

It is estimated that the current production of coconuts in India is of the order of 3,800 millions per annum. Both in respect of area and production, India ranks second among the coconut growing countries, but alone amongst them India is a net importer of copra and coconut products.

The area under coconuts and the production of coconuts and copra in the more important coconut growing countries of the World in 1952 were as follows:—

Country	Area under coconuts (Million acres)	Production of nuts (Million numbers)	Production of copra ('000 tons)	Export	
				Copra ('000 tons)	Oil ('000 tons)
Philippines	2·65	3,702	939	650	79
India	1·54	3,301	*176	..	..
Indonesia	1·50	3,200	660	337	1
Ceylon	1·07	2,221	260	41	107
Malaya	0·49	N.A.	154	61	66

* Milling copra only

The relatively low production of milling copra in India is due to the fact that about 54 per cent of the coconuts and about one-fifth of the copra are utilised for edible purposes; in short, only about one-third of the nuts produced in the country are available for the production of coconut oil.

The estimated crushing capacity of the existing mills in the different States and the quantity of copra crushed in 1953-54 were as follows:—

State	Number of mills	Number of rotaries	Number of expellers	Crushing capacity per annum * (Tons)	Quantity crushed in 1953-54 (Tons)
Travancore-Cochin	405	3,240	4	164,000	79,382
Madras	163	1,304	..	65,200	6,910
Bombay	85	198	108	63,900	26,513
Mysore	18	36	..	1,800	..
Andhra	11	33	..	1,650	153
Others	10	20	..	1,000	475
TOTAL	692	4,831	112	297,550	113,433

* On the basis of 200 working days.

The present installed capacity of the mills is more than double the quantity of copra crushed in them.

The current production of coconut oil is estimated at 130,000 tons. The average annual imports of copra and coconut oil during recent years were of the order of 40,000 tons in terms of coconut oil. The present total consumption of coconut oil is thus estimated at 170,000 tons.

SPECIAL COMMITTEES:

(i) *Oilseeds Crushing Enquiry Committee.*—In pursuance of the recommendations made in the First Plan regarding the development of the oilseeds crushing industry, a Committee was appointed by the Ministry of Food and Agriculture in January 1955 to recommend measures for the development of the oilseeds crushing industry. The Committee was required to examine in particular (i) whether it is necessary to increase or to reduce the existing oilseed crushing capacity of mills in the country, (ii) whether it would be desirable to reserve any particular seeds for crushing by the village *ghani* only, having regard to the effect of such reservation on the efficiency of production of oil and its nutritional value and having regard further to its effect on employment, the supply of oil to consuming industries and exports, and (iii) whether it is necessary to give any assistance to the village oilseeds crushing industry and if so in what form. The report of the Committee is expected to be submitted to the Government shortly.

(ii) *The Village and Small-Scale Industries (Second Five Year Plan) Committee.*—In June 1955, the Planning Commission appointed a Committee under the chairmanship of Prof. D. G. Karve (commonly known as the Karve Committee) to suggest schemes, industry-wise and State-wise, for the utilisation of the resources to be earmarked for the purpose of development of the village and small-scale industries in the Second Plan. As regards the development of the vegetable oil industry, the Committee proposed that measures should be adopted for discouraging and, where necessary, regulating on a regional basis, the crushing of sesamum, *niger* and *kardi* seeds by the mills. In view of the difficulties experienced by *ghani* owners even when organised co-operatively, in securing supplies of oilseeds in a highly competitive market, the Committee suggested that it would be necessary to organise marketing arrangements to ensure the requisite supplies of oilseeds from season to season to the *ghani* owners. It was also suggested that (a) no new oil mill should be allowed to be set up except in areas where it is not possible to adopt alternative methods of crushing oilseeds, (b) the proceeds of a cess levied on existing mills should be utilised for improving the technical equipment and marketing facilities of the *ghani* industry and interest-free loans should be given to village oilmen so that they can become shareholders of co-operative societies. The Committee was of the view that a stage has been reached for the abandonment of the old technique represented by the traditional *ghani* and the introduction of a new technique represented by an improved *ghani*. The Committee favoured the introduction of power-driven equipment in the village oil industry, provided such equipment can be operated by self-employed individuals on a decentralised basis and its introduction does not cause unemployment.

II. Programme of Development in the Second Plan

Expected availability of oil.—Under the Second Plan, it is proposed to increase the production of the five major oilseeds to 7 million tons by 1960-61. The estimated production of the major oilseeds and the estimated quantity of oil expected to be available by 1960-61 are as follows:—

	Seed ('000 tons)	Oil ('000 tons)
Groundnut	4,700	1,067
Sesamum	651	202
Linseed	428	126
Rape & mustard	1,060	323
Castor	161	56
TOTAL	7,000	1,774

The production of coconut oil is expected to be stepped up from the present level of 130,000 tons to 210,000 tons by 1960-61. The expected supplies of all major vegetable oils (including coconut oil but excluding cottonseed oil) would thus be of the order of 1,984,000 tons. A production target of 64,000 tons of oil by the technique of solvent extraction from cakes and 30,000 tons of cottonseed oil is also envisaged. No specific targets are suggested as regards the production of oil from minor oilseeds such as *mahua*, *neem*, etc. The total availability of oil from all the sources is estimated at 2,114,000 tons.

Estimated requirements.—The approximate pattern of consumption of vegetable oils in 1960-61 as against the estimated consumption in 1954-55 is envisaged as follows:—

	1954-55 ('000 tons)	1960-61 ('000 tons)
Total production	1,760	2,114
Consumption :		
(i) For edible uses	1,139	1,192
(ii) For vanaspati manufacture	259	430
(iii) For industrial and miscellaneous purposes	224	278
Exports	138	214

Consumption as edible oil.—It is not possible to forecast precisely the quantum of vegetable oils that will be required for consumption as edible oils. At present about 1,139,000 tons of vegetable oils (including coconut oil) and about 255,000 tons of vanaspati are estimated to be consumed for edible purposes in the country. This means a *per capita* consumption of 8·2 lbs. (6·7 lbs. of edible oils and 1·5 lbs. of vanaspati). The *per capita* consumption of edible oils and vanaspati is likely to increase in the coming years as a result of the higher incomes generated during the period of the Second Plan. Assuming a slightly higher level of consumption of 8·8 lbs. for a population of 40 crores by 1960-61, the total requirements of vegetable oils and vanaspati would come to about 1,572,000 tons.

As regards vanaspati, the consumption has increased at an average rate of about 20,000 tons per annum during the First Plan period. It is envisaged that the rate of increase will be about 25,000 tons per annum during the Second Plan period and on this basis the internal consumption of vanaspati is estimated to increase to about 380,000 tons in 1960-61, from the present level of 255,000 tons. This means a rise in the *per capita* consumption of vanaspati from the present level of 1·5 lbs. to 2·1 lbs.

On the basis of consumption of 380,000 tons of vanaspati, the share of vegetable oils in the total requirements during 1960-61 would be of the order of 1,1 92,000 tons. This would mean a *per capita* consumption of about 6·7 lbs. which is the same as at present. It is thus assumed that increased consumption of vanaspati will account for the *per capita* increase in consumption of vegetable oils for edible purposes. If this assumption is not borne out in actual practice and the demand for vanaspati is less than expected, then there will be correspondingly more raw oil available in the market for edible purposes. The total *per capita* consumption of animal and vegetable fats is exceedingly low in India and is bound to increase with rise in the standard of living. The demand for vegetable oils for edible purposes may ,therefore, be greater than has been assumed. On the other hand, considerable emphasis has been laid in the Agricultural plan on increasing the production of milk and of animal fats like ghee and butter, and though no definite targets have been fixed, to the extent that these plans are successful, the rise in the demand for vegetable fats will be less.

Production of 400,000 tons of vanaspati has been envisaged by 1960-61, of which 20,000 tons would be for meeting export demand. For achieving a production of 400,000 tons of vanaspati, about 430,000 tons of vegetable oils are estimated to be required.

Industrial and miscellaneous demands: (*i*) *Consumption in soap manufacture.*—For achieving the production target of 300,000 tons envisaged for the soap industry by 1960-61, about 135,000 tons of vegetable oils apart from other fats are estimated to be required in that year.

(*ii*) *Paints and varnishes.*—A production target of 60,000 tons of paints and varnishes has been envisaged in the Second Plan. For this purpose, the requirements of oils (mainly linseed oil) are estimated at 55,000 tons by 1960-61.

(*iii*) *Lubrication and miscellaneous uses.*—It is difficult to estimate the demand for vegetable oils for lubrication since mineral oils can also be used for this purpose. It is estimated that in 1954-55, 4,000 tons of vegetable oils were used for lubrication, which may go up to 10,000 tons by 1960-61.

Among miscellaneous, demands, mention may be made of the use of castor oil for pharmaceutical purposes and in the manufacture of turkey red oil and of coconut oil consumed for toilet and other domestic purposes.

The total requirements of vegetable oils for all the above industrial and miscellaneous purposes are estimated at 278,000 tons.

Exports.—On the basis of the consumption of oils for edible purposes at 1,192,000 tons about 214,000 tons would be available for export, after meeting the requirements of the vansapati industry and other industrial and miscellaneous uses. If, however, as may well prove to be the case the demand for vegetable oils for edible purposes and vanaspati shows an increase over the level of 1,622,000 tons envisaged, the quantity available for export will be correspondingly lower.

Development of the cottonseed oil industry.—Even though there has been some increase in the production of cottonseed oil in recent years, the production is far below the potential calculated on the basis of present day supplies of cottonseed. The programme for Agriculture in the Second Plan envisages the production of about 5·5 million bales of raw cotton by 1960-61. This will provide about 1·8 million tons of cottonseed, from which it is theoretically possible to produce about 180,000 tons of cottonseed oil. It is envisaged that a minimum production of 30,000 tons of cottonseed oil should be achieved by 1960-61 as against the present annual production of about 9,000 tons. For achieving this target, a fixed capital investment of Rs. 75 lakhs is estimated to be required. Since modern cottonseed oil mills would be equipped with delinting machinery also, there would be a simultaneous production of 20 million lbs. of cotton linters which can be utilised for meeting the requirements of the expanding cellulose acetate industry.

Solvent extraction of oilcakes.—The process of solvent extraction is expected to assume greater importace in the coming years *pari passu* with the emphasis given to the development of the village oil industry in the Second Plan, since the recovery efficiency of the *ghanis* is lower than that of mills and the oilcakes would be left with larger residues of oil. The establishment of further solvent extraction capacity will however depend on the existence of a satisfactory price level for oils as well as the view finally taken by the Indian Veterinary Research Institute on the optimum content of oil in the cakes intended for animal feeding. The potential scope for solvent extraction plants is estimated at 170,000 tons of oil on the basis of the oilcake resources of about 2·1 million tons in 1952-53. This would increase to about 226,000 tons by 1960-61 when the oilcake supplies are expected to be 2·83 million tons.

A capacity up to 400,000 tons of oilcake per annum, *i. e.*, 1,330 tons per day on the basis of 300 working days has already been licensed. A target of 8 lakh tons of oilcake for purposes of solvent extraction is considered as a reasonable objective for the Second Plan and for its achievement an investment of Rs. 4·5 crores will be necessary on the basis of Rs. 5 lakhs for a 30 tons-a-day plant. This will give an additional 64,000 tons of oil by 1960-61.

Development of minor oilseed resources.—If prices are favourable there should be considerable scope for expanding the production of oil from minor oilseeds and waste products. Some addition to oil supplies, though relatively small, could be effected from *neem* seeds, *mahua* seeds, tobacco seeds and also perhaps by developing maize oil production as an adjunct to starch manufacture.

Coconut development programme and expansion of coconut oil production.—The demand for coconut and coconut products is expected to increase by about 40,000 tons by the end of the Second Plan as a result of the increase in population and the larger consumption of coconut oil for the soap and toilet industries and other uses. This added to the current deficit of 40,000 tons in the supply of coconut oil (met by imports) would make a total deficit of 80,000 tons of oil. The objective in the Second Plan is to wipe out this deficit of 80,000 tons of coconut oil by the end of the Plan. By undertaking both short-term as well as long-term measures, it is proposed to increase the production of coconuts to 210,000 tons in terms of oil by 1960-61 as against 130,000 tons at present. The short-term programme includes the setting up of demonstration centres to propagate improved methods of coconut cultivation including protection of the crop against pests and diseases. Under the long-term programme the area under coconut will be increased by planting them in suitable waste lands, and by the development of nurseries for the distribution of superior varieties of plants, etc. It is also hoped to increase the yield of coconuts from 30 to 45 per tree.

Development of the village ghani *industry.*—As mentioned earlier, the problems relating to the village oil industry are being reviewed by a Special Committee. The principal items in the programme of the Khadi Board for development of the industry in the Second Plan are the improvement of the existing *ghanis*, replacement of 50,000 of the existing *ghanis* by improved or with Wardha *ghanis*, and setting up of 400 production-*cum*-demonstration centres all over the country two improved *ghanis* each and a filter press

The development programme for the vegetable oil industry in the Second Plan is summarised in the following table:

		1954-55	1960-61
Production of oil:			
(i) Solvent extraction from oil cakes (Tons)		7,000*	64,000
(ii) Cottonseed oil (Tons)		9,000*	30,000
Total including all sources (Million tons)		1·76	2·11
Utilisation of oil:			
For edible purposes	(Million tons)	1·14	1·19
For vanaspati manufacture	"	·26	·43
For other industrial purposes	"	·23	·28
Exports	"	·14	·21

*Approximte estimates for 1955-56

49. VANASPATI

I. Review of Progress in the First Plan

Targets.—The Planning Commission estimated that the demand for vanaspati would be 300,000 tons per annum by 1955-56. The capacity, existing and under construction, at the commencement of the Plan was considered sufficient to meet this demand. It was, therefore, recommended that no further capacity should be allowed to be installed during the Plan period.

The capacity and production targets for vanaspati were fixed at 388,828 tons and 300,000 tons respectively for 1955-56.

Capacity.—In April 1951 there were 48 vanaspati factories in India with an annual rated capacity of about 333,000 tons* on a 3 shift basis. In addition, there were 13 factories under construction for which the necessary plant and machinery had been imported. There are at present 51 vanaspati factories registered under the Industries (Development and Regulation) Act, 1951, with a rated capacity of about 412,000 tons. The State-wise distribution of these factories with their capacities is given below:—

State	Number of factories	Annual capacity (Tons)
Bombay	10	114,600
West Bengal	8	60,500
Madras	6	22,900
Uttar Pradesh	5	54,000
Saurashtra	4	30,000
Mysore	4	10,800
Andhra	3	18,000
Punjab	2	10,500
Madhya Pradesh	2	21,300
Delhi	2	42,000
Other States	5	27,500
TOTAL	51	412,100

One of the six factories in Madras State is the Government Hydrogenation Factory, Kozhikode, having an installed capacity of 3,000 tons per annum. This, the only vanaspati factory in the public sector, was completed some time ago but has not gone into regular production so far. The Government of Madras have decided to sell or to lease out the factory to private enterprise. The decision has not so far been implemented presumably due to the impending reorganisation of States as the factory will go to the new State of Kerala according to the proposals which have been made.

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*Computed on the basis of 300 working days in a year.

Besides these, there are seven other factories which have been completed but have not so far applied for registration so as to start production. The names of these factories and their capacities are given below:—

Name of the factory	Annual capacity (Tons)
Sudarshan Oil Mills, Katpadi (Madras)	6,000
Karnatak Vegetable Oils & Refineries, Hospet (Mysore)	7,500
The Vegetols, Chittoor (Andhra)	3,000
Hyderabad Vegetable Products, Hyderabad	7,500
Madhusudan Vegetable Products, Rakhial (Bombay)	3,000
Palanpur Vegetable Products, Palanpur (Bombay)	3,000
Patiala Vanaspati & Allied Products, Doraha (PEPSU)	3,000
TOTAL	33,000

Adding this to the capacity already registered under the Industries Act, the total capacity of the industry comes to about 445,000 tons per annum.

Eight registered factories with an annual capacity of about 45,000 tons have been closed for the last few years due to a variety of reasons, *viz.*, financial difficulties, lack of demand for their products, etc.

New schemes licensed.—The following proposals which have resulted in an expansion of the active capacity have been sanctioned for various special reasons since the Industries (Development and Regulation) Act, 1951, came into force.

——	New unit (N.U.) or substantial expansion (S.E.)	Additional capacity sanctioned
1. Amritsar Sugar Mills, Amritsar	N.U.	25 tons per day (shifting of an idle plant from within the country).
2. Delhi Cloth and General Mills, Delhi	S.E.	50 tons per day (to facilitate the utilisation of surplus hydrogen from their caustic soda chlorine plant).
3. Amrit Banaspati Co., Ghaziabad (U. P.)	S.E.	Shifting of their idle plant at Bombay to combine with their plant at Ghaziabad.
4. Aryan Industries, Secunderabad	N.U.	15 tons per day (effective steps had been taken before the Industries Act came into force).
5. Western India Vegetable Products, Bombay	S.E.	14 tons per day (shifting of an idle plant).
6. Bhavnagar Vegetable Products, Bhavnagar	S.E.	25 tons per day (shifting of an idle plant).
7. Ganesh Flour Mills, Delhi	S.E.	30 tons per day (utilisation of idle capacity on the premises).

Effect has already been given to all these proposals.

Production.—The production of vanaspati from 1950-51 onwards is given below:—

	(Tons)
1950-51	153,000
1951-52	180,000
1952-53	199,000
1953-54	199,000
1954-55	225,000
1955-56	270,000 (Estimated)

Imports and exports.—There has been no import of vanaspati for the last several years. Exports of vanaspati from 1951-52 onwards have been as follows:—

	(Tons)
1951-52	3,060
1952-53	2,800
1953-54	900
1954-55	9,370
1955-56	15,000 (Estimated)

Consumption.—On the basis of production minus exports the internal consumption of vanaspati for the last few years has been as under :—

	(Tons)
1951-52	177,000
1952-53	196,000
1953-54	198,000
1954-55	216,000
1955-56	255,000 (Estimated)

Capital and labour.—The total capital invested in the vanaspati industry is estimated at Rs. 22 crores. The labour employed is about 10,000.

Control over vanaspati.—At the commencement of the Plan control was exercised over vanaspati and embraced the regulation of prices, quality and the further development of the industry. Price control was abolished in June 1952.

On the recommendation of the Ghee Adulteration Committee, the Government made it obligatory on all vanaspati factories to add at least 300 International Units (I. U.) of synthetic vitamin 'A' per oz. of vanaspati manufactured from December 1, 1953 onwards. This fortification was raised to 700 I. U. with effect from July 1,1955. Some factories are also adding vitamin 'D' to the vanaspati manufactured by them.

The present policy of the Government of India is not to permit any further expansion of the industry.

Prices of groundnut oil and vanaspati.—Groundnut oil constitutes the principal element of cost (about 80 per cent) in the price of vanaspati. The price of groundnut oil and consequently that of vanaspati fluctuated widely during the first three years of the Plan. These prices have, however, become more stable during the last two years. The high price of groundnut oil during 1953-54 was responsible for checking during that year the rising trend in the consumption of vanaspati.

Action on major recommendations.—It was recommended that in order to relieve pressure on the supplies of groundnut oil, the vanaspati industry should take to the use of cottonseed oil and that in order to facilitate this change-over the Government should consider the possibility of levying a lower excise duty on vanaspati manufactured entirely from such oil.

This question was considered and it was decided that the rate of duty should not be altered as it would be impracticable to distinguish between vanaspati made from cottonseed oil and that made from groundnut and other oils, in the absence of any suitable chemical or other test.

The use of cottonseed oil in the manufacture of vanaspati during the last few years has been as indicated below:—

Year	(Tons)
1951	1,800
1952	4,400
1953	8,500
1954	5,000
1955	700 (Estimated)

The setback in the consumption of cottonseed oil during 1954 and 1955 was due to the free availability and low prices prevailing for groundnut oil during these years. The industry would be quite ready to use cottonseed oil if the price is sufficiently below that of groundnut oil to offset the higher cost of refining it.

II. Programme of Development in the Second Plan

Estimated consumption.—The consumption of vanaspati in India has increased at an average rate of about 20,000 tons per annum during the First Plan period. Assuming that the rate of increase will rise to about 25,000 tons per annum during the Second Plan, the internal consumption of vanaspati may be estimated at about 380,000 tons in 1960-61.

Targets of capacity and production.—The existing capacity of the industry, *i.e.* 445,000 tons per annum, is considered sufficient to meet the demand for vanaspati during the Second Plan period.

There has been a spurt in the export of vanaspati during the last two years of the First Plan. Although this is reported to be a temporary phase due to derationing and the consequent higher demand for fats in the United Kingdom which is at present the major importer of Indian vanaspati, it may be possible to step up the export of vanaspati to 20,000–25,000 tons per annum during the Second Plan period if foreign markets are properly explored. In this connection the establishment of an Export Promotion Council has been suggested.

To meet the internal and external demand for vanaspati a production target of about 400,000 tons of vanaspati in 1960-61 appears to be quite adequate.

Requirements of raw materials.—To achieve a production of 400,000 tons of vanaspati in 1960-61 the industry will require the following quantities of the principal raw materials.

	(Tons)
Groundnut oil	406,000
Sesame oil	24,300
Bleaching earth	4,000
Caustic soda	2,000
Nickel formate	400
Synthetic vitamin 'A'	3½ (10 million million I.U.)
Tin plate	35,000

The industry is at present experiencing some difficulty in regard to the supply of tin plate. The situation is expected to improve with the implementation of the development programme for the iron and steel industry in the Second Plan.

The table below summarises the programme of development for the vanaspati industry in the Second Plan.

	1955-56	1960-61
Installed capacity ('000 tons)	445	445
Production ('000 tons)	270 (Estimated)	400
Domestic consumption ('000 tons)	255	375 to 380
Exports ('000 tons)	15	20

50. BISCUITS AND CONFECTIONERY

A. Biscuits

I. Brief Survey of the Industry

Location, rated capacity and production.—The year 1897 saw for the first time biscuit factories adopting scientific and mechanised means of production in this country. The development was slow for over 30 years but progress was satisfactory thereafter. There are at present 39 organised factories with a capacity of about 33,750 tons per year. Besides there are a large number of small units catering to local needs. These 39 units are well equipped with necessary plant and machinery while in the small units production is carried on by traditional methods. The Shalimar Biscuits Co., Bombay, have set up a plant with an annual capacity of 750 tons which has recently gone into production. The Britannia Biscuits Co., Calcutta, have recently modernised their plant and air-conditioned part of their factory.

The Federation of Biscuit Manufacturers of India has estimated the installed capacity in the country at between 40,000 and 50,000 tons on single shift working.

The regional distribution of 39 organised units and their capacity according to the assessment of the Development Wing of the Ministry of Commerce and Industry is as follows:—

State	Number of units	Installed capacity (Tons)
1. West Bengal	15	11,170
2. Uttar Pradesh	6	5,032
3. Bombay	8	10,425
4. Bihar	2	480
5. Rajasthan	3	3,185
6. Punjab	1	1,500
7. Hyderabad	1	810
8. Delhi	1	750
9. Orissa	1	138
10. Saurashtra	1	260
	39	33,750

The production of the organised units from 1951 onwards has been as follows :—

Year	Production (Tons)
1951	15,900
1952	12,300
1953	11,100
1954	10,800
1955	11,765

The production of biscuits in the organised sector has been falling since 1951. Only in the year 1955, has there been slight improvement.

Imports and exports.—The import of biscuits into India is at present very small. The import control (January-June 1956) limits the import quota to 20 per cent of half of the best year's imports.

The imports of biscuits during the last five years have been as follows :—

Year	Quantity (Tons)	Value (Rs.)
1951-52	191	9,01,700
1952-53	16	94,100
1953-54	204	9,85,000
1954-55	132	6,90,300
1955-56 (Ten months, April to January)	107	5,56,300

The export of biscuits is very limited and is confined to some of the neighbouring countries. Biscuits and cakes have been separately specified in the Foreign Trade and Navigation Accounts of India only since 1954. The figures of exports are as follows :—

Year	Quantity (Tons)	Value (Rs.)
1954-55	6	22,700
1955-56 (Ten months, April to January)	4	16,250

The low exports are due to the high prices of wheat flour, milk powder and packing materials compared to those prevailing in other exporting countries like the United Kingdom.

Consumption.—The domestic demand for biscuits produced for the market by the organised producers fell steadily from 1951 to 1954. There was a slight increase in demand in the year 1955-56. This may not reflect any fall in consumption since a part of the demand could have been met from production in the decentralised sector.

The quantity available for consumption during the last five years taking the production of organised sector and imports minus exports have been as follows :—

Year	*Production (Tons)	Imports (Tons)	Exports (Tons)	Quantity available for consumption (Tons)
1951-52	15,900	191	..	16,091
1952-53	12,300	16	..	12,316
1953-54	11,100	204	..	11,304
1954-55	10,800	132	6	10,926
1955-56	11,765	†130	†5	11,890

* Figures relate to calendar years

† Estimated

Besides this an unestimated quantity produced by unorganised small producers is also available for consumption.

Capital and labour.—According to the latest Census of Manufacturers (1952) the fixed capital invested by 88 factories (including bakeries and confectioneries) was about Rs. 2,56 lakhs in 1952. The number of persons employed by the units was estimated at about 6,450.

Raw materials.—Wheat flour, sugar and fat constitute the important raw materials in biscuit-making. Besides these basic ingredients, auxiliary materials, such as milk solids, glucose, honey, flavours, malt, antioxidants etc., are also required in small quantities.

Flour.—The quality of biscuits depends to a very large extent on the quality of the flour used. Although some difficulty was experienced in obtaining flour during the period of food scarcity, the position has now considerably eased.

Fat or shortening.—Hydrogenated groundnut oil is the most commonly used shortening in this country. The hydrogenated fat industry in the country is very well established and there is no difficulty in providing the necessary quantities required for the biscuit industry. As regards quality the use of 41°C shortening is considered to be most suitable.

Antioxidants.—Antioxidants are not available indigenously and have to be imported.

Quality.—Some of the manufacturers are producing biscuits fairly comparable to the best imported varieties.

Some of the units have modernised their machinery in recent years. In these plants air-conditioning has been introduced for processing and storage. These units have also the advantage of the guidance of competent experts.

The quality of biscuits manufactured in India, however, requires standardisation. Generally they possess poor keeping quality for a tropical climate. The use of antioxidants and better packing methods should overcome this defect.

A Sectional Committee has been set up by the Indian Standards Institution to formulate standards for the raw materials and the finished products of the biscuit industry.

Problems of the industry.—The main problem of the industry is the low demand for its products resulting in only about 30 per cent of the capacity of the organised industry being utilised at present. The price of sugar in India is rather high and this is one of the factors which seems to hinder the promotion of an export trade in biscuits.

Another problem which the industry is facing is lack of finance and expert personnel. The supply of flour was satisfactory during the year 1955-56, but the material was not of uniform quality as desired by the manufacturers.

II. Programme of Development in the Second Plan

Estimated requirements.—The Federation of Biscuit Manufacturers of India estimated the present demand at about 12,000 tons and envisaged that by 1960-61 it would rise to 15,000 tons per year.

The question of demand was considered at a meeting held in the Planning Commission with the representatives of the industry, where it was stated that the demand for the output of organised units may not increase to more than 15,000 tons by 1960-61. This is also borne out by the present trend in production.

Targets of capacity and production.—The present capacity of the industry is sufficient to meet the demand likely to arise by 1960-61. No further increase in capacity is, therefore, envisaged. Production of 15,000 tons is anticipated by the end of 1960-61.

Miscellaneous.—During the Second Plan the main emphasis should be directed to securing an increase in exports. To this end, it is essential to improve the quality of the biscuits produced in the country.

The question of packing is very important in connection with the encouragement of exports of biscuits. A well made biscuit can be spoiled in a short time in storage if it is not afforded suitable protection by packing. The different materials required in the biscuit industry are grease-proof and moisture-proof, paper-glassine paper, waxed paper, fibre board cartons and other printed wraps. These packing materials are mostly imported and every effort should be made to encourage the manufacture of these materials within the country. Suitable specifications should also be laid down for packing materials.

B. CONFECTIONERY

I. Brief Survey of the Industry

The manufacture of confectionery in India is generally carried out by sugar factories as a subsidiary industry. There are, however, a number of manufacturers who buy sugar from the market and manufacture confectionery. The principal types of confectionery manufactured in India are hard boiled sweets, caramel and toffee, satin goods, comfits or dragees and lozenges.

Location, rated capacity and production.—There are at present 40 organised confectionery factories with an annual capacity of about 40,600 tons.

The Indian Confectionery Manufacturers Association has estimated the annual capacity of the industry on a single shift basis of 8 hours at about 50,000 tons.

It is difficult to estimate the total capacity of the industry as a good proportion of confectionery is produced by small unorganised units.

The regional distribution of 40 organised units along with the combined capacity of units in each region is given below:—

State	Number of units	Installed capacity (Tons)
1. Bombay	15	12,426
2. Bihar	1	100
3. Madras	8	10,726
4. Uttar Pradesh	4	2,916
5. Madhya Pradesh	3	3,692
6. West Bengal	3	1,320
7. Rajasthan	2	5,700
8. Hyderabad	1	1,020
9. Madhya Bharat	1	225
10. Mysore	1	2,100
11. Bhopal	1	375
TOTAL	40	40,600

The production of confectionery by the organised units from 1951 onwards has been as follows: —

Year	Production (Tons)
1951	12,400
1952	10,000
1953	9,000
1954	7,800
1955	7,840

The fall in production since 1952 in the organised sector is ascribed to slump in the market.

Imports and exports.—The present import control limits the import quota for confectionery to 10 per cent (5 per cent general and 5 per cent soft) of half of the best year's imports.

The import of confectionery as given in the Foreign Trade and Navigation Accounts of India has been as follows:—

Year	Quantity (Tons)	Value (Rs.)
1951-52	50	2,21,400
1952-53	20	1,03,800
1953-54	40	2,19,800
1954-55	45	2,54,000
1955-56 (Ten months, April to January)	53	2,88,000

During the Second World War exports were made on a large scale to countries like Burma and Ceylon. But subsequently on account of the scarcity of sugar in the country, exports of confectionery were banned. Later when this ban was lifted, it was not practicable for the industry to effect any substantial exports due to keen competition from foreign producers. The cost of production of Indian confectionery being higher than that of foreign manufacturers, it is difficult for the Indian manufacturers to stand the competition and as a result, foreign markets have been lost. However, there would be good demand for Indian confectionery in some of the neighbouring countries if the prices could be reduced to competitive levels.

The quantum and the value of exports of Indian confectionery to neighbouring countries during recent years are given in the table below:—

Year	Quantity (Tons)	Value (Rs.)
1951-52	15	41,400
1952-53	37	85,700
1953-54	18	43,400
1954-55	44	88,400
1955-56 (Ten months, April to January)	23	49,800

Consumption.—The demand for confectionery has shown a decline since 1952. The quantities available for consumption during the last five years taking the production of the organised sector of the industry and imports minus exports are as follows:—

Year	*Production (Tons)	Imports (Tons)	Exports (Tons)	Quantity available for consumption (Tons)
1951-52	12,400	50	15	12,435
1952-53	10,000	20	37	9,983
1953-54	9,000	40	18	9,022
1954-55	7,800	45	44	7,801
1955-56	7,840	†64	†28	7,876

* Figures relate to calendar years.

† Estimated

Raw materials.—The confectionery factories in India have to face considerable difficulties in regard to the supply of their raw materials, such as liquid glucose, essence, colours, milk powder, wrapping papers etc.

Sugar is the basic raw material of the industry and on an average accounts for 40 per cent of the total production cost of confectionery. But its high price in India as compared to other countries is one of the greatest handicaps of the Indian manufacturers when competing in the world markets.

The quality of confectionery largely depends on the quality of the glucose used. The availability of indigenous liquid glucose has recently shown considerable improvement and it may be possible in the near future to meet the entire requirements from domestic supplies.

Essences, food colours and milk powder are the other important raw materials required for the manufacture of confectionery. These materials of the quality suitable for the confectionery industry are not produced in this country and so requirements are being met by imports.

For wrapping papers also including printing cellophane and waxed paper the industry depends on imports.

Quality.—Considerable improvement has been made in recent years in the quality of confectionery produced in India. The Indian Confectionery Manufacturers Association with the help of technical experts has laid down some standards for confectionery products. The member factories have been directed to manufacture confectionery according to the standards prescribed by the Association. The question of laying down certain standards for different varieties of confectionery has also attracted the attention of the Indian Standards Institution.

Problems of the industry.—As in the biscuit industry, the main problem of the confectionery industry is to secure more intensive utilisation of its existing capacity. At present only about 20 per cent of the capacity of the organised industry is being utilised.

There are a large number of small manufacturers who produce confectionery under unhygienic conditions. The small-scale manufacturers, on account of low overhead cost are able to undersell the organised large-scale factories.

This industry is also facing difficulties in securing its requirements of working finance.

II. Programme of Development in the Second Plan

Estimated requirements.—The Indian Confectionery Manufacturers Association estimates the present annual demand for quality confectionery at 8,000 tons, which is expected to rise to 10,000 tons per annum by 1960-61.

Additional capacity.—Since a large part of the existing capacity is lying idle it does not seem necessary to expand capacity further for meeting the probable demand in 1960-61.

Miscellaneous.—During the Second Plan the main emphasis has to be placed on increasing exports which can only be established by lowering prices while various methods like rebate of excise duty on the sugar consumed by the industry and drawback of duty on imported raw materials etc. have been suggested, it has not so far been found possible to adopt any of them. The manufacture of some of the packing materials like printing cellophane, waxed paper etc., is proposed to be expanded during the Second Plan period, which should reduce the dependence on imports.

The following table summarises the programme of development for the biscuit and confectionery industry during the Second Plan:—

		1955-56	1960-61
(*i*) *Biscuits* (*organised sector only*) :			
(a) Capacity	(Tons)	33,750	33,750
(b) Production	,,	11,765	15,000
(*ii*) *Confectionery* (*organised sector only*):			
(a) Capacity	,,	40,600	40,600
(b) Production	,,	7,840	10,000

51. FRUIT AND VEGETABLE PRESERVATION

The canning of fruits and vegetables is an industry which in India is still in its infancy. Compared to certain other countries like the United Kingdom, the U. S. A., Canada and Australia its size and output are very small. Thus as against a production of about 6 million tons in the U. S. A., over 400,000 tons in the United Kingdom, 300,000 tons in Canada and 160,000 tons in Australia, the average annual output of canned fruits and vegetables in India is only of the order of 2,000-3,000 tons and of fruit and vegetable products of all kinds only about 20,000 tons. While a variety of fruits and vegetables are grown in the country which provides good scope for the development of the industry, inadequate domestic demand and a general prejudice within the country against canned products have retarded its growth, while for a variety of reasons it has not been possible to develop any large export market.

The industry is a natural and logical corollary of the development of horticulture. Its importance in this country lies in the fact that it could prove a useful means of strengthening the agricultural economy and furthering rural industrialisation. Since it admits of being organised on a decentralised basis, it has considerable potentialities for providing employment in the rural and semi-urban areas. Given proper encouragement and assistance, it should also be possible to develop a large export market for its products.

I. Brief Survey of the Industry

Although the art of preserving fruits and vegetables has been known and practised in India from ancient times, its development along modern scientific lines is of quite recent origin. The first modern unit for fruit canning was set up in the twenties of this century. A few more factories came into existence in the subsequent decade. The period of World War II witnessed the establishment of a large number of units for processing fruits and vegetables for which there was a substantial demand from the Defence Services. Since then, however, the demand has declined and the industry is operating much below its capacity.

The industry, as it exists at present, consists very largely of a number of small and decentralised units scattered over different parts of the country. Many of them work sporadically, there being no steady demand for their products and they lack both the equipment and the finance required for the manufacture of quality products. Considerable progress has to be made by these units before they can come up to the level of the few efficient and organised factories.

Location, rated capacity and production.—The industry is regulated by the Fruit Products Order, 1948 (as amended in 1955) which has brought the manufacture of fruit and vegetable products under compulsory licensing so as to ensure that it is carried on in hygienic conditions and the products conform to standard specifications. The number of units licensed under this Order was 602 in the year 1953, 660 in 1954 and 654 in 1955. Though the industry is scattered all over India, production is mainly concentrated in Bombay, Delhi, Nagpur, Amritsar and Uttar Pradesh. Out of the 600 and odd factories in existence in 1953, the annual turnover of 300 was less than Rs. 4,000 and that of another 166 units was within the range of Rs. 4,500 to Rs. 10,000. The output of 78 units was valued between Rs. 10,000 to Rs. 50,000. Only 57 units out of the 602 licensed manufacturers had an annual output exceeding Rs. 50,000 and only 7 an output of over Rs. 5 lakhs. Thus the industry includes a large number of small and cottage manufacturers. But though they are large in number, their production is only a fraction of the total output. These units are mainly confined to the production of pickles, syrups, vinegar, sauces and preserves (*murabba*). The large-scale manufacturers, on the other hand, concentrate mainly on the production of canned fruits and vegetables, *chutney*, fruit beverages, preserves (*murabba*) and jams. The number of licencees manufacturing different categories of products and their output in 1954 are indicated below:—

	Number of manufacturer in 1954	Estimated production in 1954	
		Quantity (Tons)	Value (Rs. lakhs)
Fruit beverages	265	1,528	29·1
Synthetic syrups	399	537	11·1
Canned fruits	78	897	20·2
Canned vegetables	51	1,126	16·0
Jams, jellies and marmalades	154	401	9·4
Preserves (*Murabba*)	169	1,293	16·7
Chutney	180	654	12·5
Tomato products	132	193	4·0
Vinegar	297	422	3·8
Pickles	276	1,726	10·9
Aerated fruit beverages and other fruit products	N. A.	2,765	27·9
TOTAL	N.A.	11,542	1,61·6

Of the total output, Bombay accounted for 3,266 tons (valued at Rs. 46·3 lakhs) followed by West Bengal 1,625 tons (Rs. 27·0 lakhs), Delhi 2,273 tons (Rs. 24·4 lakhs), Uttar Pradesh 1,191 tons (Rs. 16·8 lakhs), Punjab 1,538 tons (Rs. 13·3 lakhs) and Madhya Pradesh 460 tons (Rs. 9·4 lakhs). Production in other areas is comparatively small. These production figures have been compiled on the basis of data furnished by the manufacturers licensed under the Fruit Products Order. It has, however, been observed that the production figures furnished by the factories are generally underestimates. The system of levying a licensing fee based on annual turnover has resulted in factories reporting their production as lower than what it actually is. Furthermore, in spite of the compulsory nature of the Fruit Products Order, surreptitious production by some unlicensed factories still continues. Taking all these factors into consideration, the present average production of all varieties of fruit and vegetable products is estimated at about 20,000 tons per annum.

It is difficult to arrive at a precise estimate of the existing capacity of the industry. As already stated, many of the units operate only for a few months in a year depending on the availability of fruit and vegetables and the demand for their products. It is, however, known that the industry is working at much below its capacity and that the production of existing units could be stepped up considerably if conditions were favourable for the development of the industry.

The present position in regard to different products is briefly indicated below:—

(a) *Fruit beverages.*—The fruit beverage industry is well spread throughout India and has made quite satisfactory progress. The manufacturers in this line have fairly well-established factories and have installed adequate equipment and machinery. Amongst the fruit beverages that are marketed, the important ones are orange, lemon, lime, mango, and pineapple. On an average, the annual production of beverages is about 20 per cent of the total production of fruit products in the country.

The Tariff Board in their enquiry in 1951 into the continuance of protection to the preserved fruits industry observed that the progress of the fruit beverage industry had been quite satisfactory and that both the quality and the price of its products are comparable to those of imported goods. These items were, therefore, excluded from the protected categories of fruit products.

(b) *Canned fruits and vegetables.*—The canning of fruits and vegetables has been taken up in India comparatively recently. The most important fruits that are being canned are mango, pineapple, orange, pear, guava and papaya. Small quantities of peaches, apricots, cherries, and other temperate region fruits are also being canned; but these fruits are not extensively grown and the lack of them has been especially felt since the partition of the country. There is scope for the canning of pineapple in Assam, Tripura, North West Bengal and Travancore-Cochin and of oranges in Madhya Pradesh, Assam and Coorg. These two fruits have considerable export potentialities. The canning of mangoes can similarly be further extended not only for the internal market but for the overseas market as well.

The canning of vegetables is at present more or less restricted to the supply of the Defence Services who are by far the largest buyers. The entire requirements of the Defence Services are being met from local production and this has given considerable support to the industry. The total quantity purchased by the Chief Director of Purchases amounted to 1,672 tons valued at Rs. 29·44 lakhs in 1952-53 and 796 tons valued at Rs. 12·97 lakhs in 1953-54.

Canners engaged in the manufacture of canned fruits and vegetables have installed adequate equipment and machinery and a large number of them have also engaged technicians. The capacity of twelve of the more important units has been assessed by the Chief Director of Purchases at about 55 tons per day on a single shift basis or approximately 11,000 tons per annum on the basis of operation for 200 working days. As against this the total estimated average production of canned fruits and vegetables is only about 2,000 tons equivalent to about 20 per cent of the installed capacity of the major units of the industry. This is indicative of the large idle capacity existing in this sector of the industry.

Canned fruits have enjoyed protection since 1947. The Tariff Commission has recommended the continuance of protection to this industry till December 31, 1956 and the Government have accepted this recommendation.

(c) *Chutney.*—Mango *chutney* has a unique importance amongst the fruit products manufactured in India because of the established market for it in many parts of the world. The present production is about 700 tons which could easily be augmented if suitable steps were taken to popularise this product. Production is mainly carried out in the old conventional style and most of the manufacturers are disinclined to change to modern practices and to take to quality control of production. This is a line which offers considerable scope for providing employment in the villages, since mango slices in brine, which are required for the manufacture of mango *chutney*, are produced at the village level.

(d) *Jams.*—The simple technique required for making jam has prompted a large number of persons to take to its manufacture. Competition from imported products and the wide variations in the quality of the domestic products have been the two major obstacles to the development of the industry. Though it has received continuous protection since 1947 the quality of the jams manufactured tends to be below the standard required to make them acceptable. Future development is, therefore, closely related to improvement in quality.

(e) *Preserves* (Murabba).—The manufacture of preserves is carried on in the traditional Indian style. The main producing centres are Delhi, Amritsar and Banaras. The present production is placed at about 1,300 tons. The conditions of manufacture of these products are not satisfactory and the introduction of modern techniques of processing is important for the development of this industry.

(f) *Pickles.*—The manufacture of pickles is also a small-scale industry. Mango is the major fruit used for pickling purposes.

(g) *Vinegar.*—While vinegar can be brewed from low quality fruit, its production has become very small with the advent of cheap synthetic vinegar produced by the dilution of acetic acid, *Capital and labour.*—Owing to its decentralised character it is difficult to estimate accurately the capital and labour employed by the industry. According to the Tariff Commission Report (1954) on the continuance of protection to the preserved fruits industry, the capital invested in 33 units exceeds Rs. 1,27 lakhs. The total capital invested in the industry may be of the order of Rs. 3 to 4 crores. The number of persons directly employed by the industry is estimated at 7,500.

Raw materials.—The important raw materials used by the fruit and vegetable preservation industry are fruits and vegetables, sugar, salt, tins and bottles. The requirements of these raw materials for the present production of 20,000 tons are estimated at 12,000 tons of fruits and vegetables, 4,415 tons of sugar, 5,000 tons of bottles and 1,000 tons of tin plate which include 600 tons of tin plate of special type. There are no special difficulties about securing supplies of these raw materials, but the prices at which they are available to the industry in India are in many cases appreciably higher than those prevailing in certain other countries. Thus many countries provide sugar and tin plate to the industry at concessional rates. Even where, with the gradual development of the industry, these concessions have been withdrawn from products manufactured for home consumption, they have been, in many instances, continued for products for the expo t market. If it were possible to give similar concessions to the indigenous industry, the consumption of fruit and vegetable products could be substantially increased.

Imports and exports.—Imports of fruit and vegetable products at present average about 1,000 tons per year. Although this is only 5 per cent of the total poduction in the country, in specific items like jams and canned fruits the percentage of imports is much higher. Despite the fact that certain categories of fruit products are protected, the general prejudice against indigenous products is such that there is a demand for imported products even at higher prices.

The export of fruit and vegetable products from India has so far been much below what it should be. The average export of canned fruits and vegetables is about 1,000 tons per annum compared to 64,000 tons by Australia, 55,000 tons by the U. S. A., 30,000 tons by the Philippines, 19,000 tons by South Africa and about 14,000 tons by Malaya in 1952. Some fruit products, which are specialities of Indian manufacturers, like mango *chutney*, canned mangoes, guavas and papayas are in demand in foreign markets. There is also scope for the expansion of export of canned oranges and pineapples, but the high prices of Indian products, compared to other exporting countries have prevented the development of the export trade.

Problems of the industry.—The main difficulties of the industry are the high cost of some of the raw materials and the inadequate demand for its products. At present most of the major manufacturing units are located in urban areas and have to pay high prices for fruits and vegetables which are purchased from the local markets. The manufacturers are reluctant to set up factories in areas where fruit and vegetables are grown since they would suffer from various handicaps particularly in regard to the supply of other raw materials like sugar, tins and bottles and also in regard to power and transport facilities, etc. The establishment of direct contact between the manufacturers and the growers of fruit and vegetables, wherever possible, should get over this difficulty. As regards sugar and tin plate, their prices, as mentioned earlier, are higher than those prevailing in other competing countries. This is one of the main reasons for the higher cost of indigenous products. It has also been stated that the quality of the tin plate manufactured in the country is not wholly suitable for the purposes of the industry. In order to bring down the price of tin cans required by the industry the Tariff Commission recommended that the Government should consider (a) the waival of contribution to the steel equalisation fund in respect of tin plate used for the manufacture of open top cans for the fruit and vegetable preservation industry and (b) the removal of the extra price charged for charcoal quality tin plate No. 2. The Government have not, however, found it possible to accept these recommendations.

Inadequate transport facilities and lack of finance have also often been mentioned as factors contributing to the difficulties of the industry. The transport of vegetables and fruits which are perishable commodities needs special attention. The industry has argued the necessity of speedy transport by fast trains and the provision of specially ventilated wagons. It has also complained that the rates charged by the Railways are excessive and that the Railway Board should consider the reclassification of fruit and vegetable products so as to bring them into a lower class. As regards finance, the seasonal character of the industry makes it necessary to lock up large amounts in working capital, which is not easily available from scheduled banks. The industry is not viewed very favourably by banks in the matter of advances as the finished products are sometimes not considered a very safe security.

II. Programme of Development in the Second Plan

Estimated requirements and targets of capacity and production.—The present consumption of preserved fruit and vegetable products of all kinds is believed to be about 20,000 tons per annum. This corresponds to a *per capita* consumption of 2 ounces per annum. When compared to the *per capita* consumption in other countries like the U.S.A. (*86 lbs.), Canada (*57 lbs.), the U. K. and Australia (*20 lbs.), the consumption of preserved fruit and vegetable products in India is exceedingly low. The meagre demand for these products in this country is mainly attributed to the low income of the people. The demand for exports in the past has also remained at a low level, mainly on account of the high cost of Indian products as compared to those of other competing countries.

The formulation of a development programme for the industry in the Second Plan was entrusted to a Panel set up by the Ministry of Food and Agriculture. The Panel suggested that the *per capita* consumption of preserved fruits and vegetables in the country should be increased from the current level of 2 ounces to 8 ounces by 1960-61 and further that an export target of 11,000 tons should be envisaged for 1960-61 as against the current level of 1,000 tons per annum. In the light of these two objectives the Panel recommended that the production of preserved fruits and vegetables should be stepped up to 100,000 tons per annum by 1960-61.

The recommendations of the Panel were considered by the Ministry of Food and Agriculture who were of the opinion that the production target should be envisaged at 50,000 tons per annum by 1960-61 including a target of 11,000 tons for export. In order to achieve these targets it was recommended that the following measures should be considered with a view to bringing down the cost of production of preserved fruits and vegetables and thus expanding internal consumption and enabling export markets to be developed:

(a) a subsidy of Rs. 500 per ton on the tin plate supplied to the industry, and

(b) the grant of special rebate of Rs. 300 per ton in the price of sugar consumed in the manufacture of exported products.

These recommendations are at present under consideration of the Government.

If these concessions are extended to the industry it may not be difficult to achieve a production of 50,000 tons by 1960-61. The additional production is expected to be attained by a fuller utilisation of the existing capacity and through the establishment of new canneries in the fruit growing areas. A part of the additional capacity is expected to come up in the form of small-scale units or co-operative enterprises in the decentralised sector.

A provision of Rs. 1·75 crores has been made by the Ministry of Food and Agriculture in the Second Plan for the development of the fruit and vegetable preservation industry and the setting up of cold storage plants. The provision covers the estimated cost of such concessions as may be given in respect of sugar and tin plate and includes loan assistance for the establishment of new canneries in underdeveloped regions like Assam, Kulu (Punjab), etc., where fruit is grown in abundance but cannot find an economic outlet at present. Provision has also been made for technical education in the preservation of fruits and vegetables and for regional research. Some State Governments have provided for the establishment of small-scale canneries as part of their programmes for the development of village and small-scale industries in the Second Plan.

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* The figures relate to the year 1952.

Requirements of raw materials.—In order to achieve a production of 50,000 tons of preserved fruits and vegetables by 1960-61 the industry will require the following quantities of the principal raw materials:—

	(Tons)
Fruits and vegetables	30,000
Sugar	16,200
Tin plate	1,400

There is some difficulty at present about the supply of tin plate but the situation is expected to improve with the implementation of the development programme for the iron and steel industry in the Second Plan.

The table below summarises the development programme for the fruit and vegetable preservation industry in the Second Plan:—

		1955-56	1960-61
Production	(Tons)	20,000	50,000
Domestic consumption	,,	20,000	39,000
Exports	,,	1,000	11,000

GOVERNMENT OF INDIA

INDUSTRIAL POLICY RESOLUTION

New Delhi, the 30th April, 1956

No. 91/CF/48.—The Government of India set out in their Resolution dated the 6th April, 1948, the policy which they proposed to pursue in the industrial field. The Resolution emphasised the importance to the economy of securing a continuous increase in production and its equitable distribution, and pointed out that the State must play a progressively active role in the development of industries. It laid down that besides arms and ammunition, atomic energy and railway transport, which would be the monopoly of the Central Government, the State would be exclusively responsible for the establishment of new undertakings in six basic industries—except where, in the national interest, the State itself found it necessary to secure the co-operation of private enterprise. The rest of the industrial field was left open to private enterprise though it was made clear that the State would also progressively participate in this field.

2. Eight years have passed since this declaration on industrial policy. These eight years have witnessed many important changes and developments in India. The Constitution of India has been enacted, guaranteeing certain Fundamental Rights and enunciating Directive Principles of State Policy. Planning has proceeded on an organised basis, and the First Five Year Plan has recently been completed. Parliament has accepted the socialist pattern of society as the objective of social and economic policy. These important developments necessitate a fresh statement of industrial policy, more particularly as the Second Five Year Plan will soon be placed before the country. This policy must be governed by the principles laid down in the Constitution, the objective of socialism, and the experience gained during these years.

3. The Constitution of India, in its preamble, has declared that it aims at securing for all its citizens—

> "JUSTICE, Social, economic and political;
>
> LIBERTY of thought, expression, belief, faith and worship;
>
> EQUALITY of status and of opportunity; and to promote among them all;
>
> FRATERNITY assuring the dignity of the individual and the unity of the Nation."

In its Directive Principles of State Policy, it is stated that—

> "The State shall strive to promote the welfare of the people by securing and protecting as effectively as it may a social order in which justice, social, economic and political, shall inform all the institutions of the national life."

Further that—

> "The State shall, in particular, direct its policy towards securing—
>
> (a) that the citizens, men and women equally, have the right to an adequate means of livelihood;
>
> (b) that the ownership and control of the material resources of the community are so distributed as best to subserve the common good;
>
> (c) that the operation of the economic system does not result in the concentration of wealth and means of production to the common detriment;

(d) that there is equal pay for equal work for both men and women;

(e) that the health and strength of workers, men and women, and the tender age of children are not abused and that citizens are not forced by economic necessity to enter avocations unsuited to their age or strength;

(f) that childhood and youth are protected against exploitation and against moral and material abandonment."

4. These basic and general principles were given a more precise direction when Parliament accepted in December 1954, the socialist pattern of society as the objective of social and economic policy. Industrial policy, as other policies, must therefore be governed by these principles and directions.

5. In order to realise this objective, it is essential to accelerate the rate of economic growth and to speed up industrialisation and, in particular, to develop heavy industries and machine making industries, to expand the public sector, and to build up a large and growing co-operative sector. These provide the economic foundations for increasing opportunities for gainful employment and improving living standards and working conditions for the mass of the people. Equally, it is urgent, to reduce disparities in income and wealth which exist today, to prevent private monopolies and the concentration of economic power in different fields in the hands of small numbers of individuals. Accordingly, the State will progressively assume a predominant and direct responsibility for setting up new industrial undertakings and for developing transport facilities. It will also undertake State trading on an increasing scale. At the same time, as an agency for planned national development, in the context of the country's expanding economy, the private sector will have the opportunity to develop and expand. The principle of co-operation should be applied wherever possible and a steadily increasing proportion of the activities of the private sector developed along co-operative lines.

6. The adoption of the socialist pattern of society as the national objective, as well as the need for planned and rapid development, require that all industries of basic and strategic importance, or in the nature of public utility services, should be in the public sector. Other industries which are essential and require investment on a scale which only the State, in present circumstances, could provide, have also to be in the public sector. The State has therefore to assume direct responsibility for the future development of industries over a wider area. Nevertheless, there are limiting factors which make it necessary at this stage for the State to define the field in which it will undertake sole responsibility for further development, and to make a selection of industries in the development of which it will play a dominant role. After considering all aspects of the problem, in consultation with the Planning Commission, the Government of India have decided to classify industries into three categories, having regard to the part which the State would play in each of them. These categories will inevitably overlap to some extent and too great a rigidity might defeat the purpose in view. But the basic principles and objectives have always to be kept in view and the general directions hereafter referred to followed. It should also be remembered that it is always open to the State to undertake any type of industrial production.

7. In the first category will be industries the future development of which will be the exclusive responsibility of the State. The second category will consist of industries, which will be progressively State-owned and in which the State will therefore generally take the initiative in establishing new undertakings, but in which private enterprise will also be expected to supplement the effort of the State. The third category will include all the remaining industries, and their future development will, in general, be left to the initiative and enterprise of the private sector.

8. Industries in the first category have been listed in Schedule A of this Resolution. All new units in these industries, save where their establishment in the private sector has already been approved, will be set up only by the State. This does not preclude the expansion of the existing

privately owned units, or the possibility of the State securing the co-operation of private enterprise in the establishment of new units when the national interests so require. Railways and air transport, arms and ammunition and atomic energy will, however, be developed as Central Government monopolies. Whenever co-operation with private enterprise is necessary, the State will ensure, either through majority participation in the capital or otherwise, that it has the requisite powers to guide the policy and control the operations of the undertaking.

9. Industries in the second category will be those listed in Schedule B. With a view to accelerating their future development, the State will increasingly establish new undertakings in these industries. At the same time private enterprise will also have the opportunity to develop in this field, either on its own or with State participation.

10. All the remaining industries will fall in the third category, and it is expected that their development will be undertaken ordinarily through the initiative and enterprise of the private sector, though it will be open to the State to start any industry even in this category. It will be the policy of the State to facilitate and encourage the development of these industries in the private sector, in accordance with the programmes formulated in successive Five Year Plans, by ensuring the development of transport, power and other services, and by appropriate fiscal and other measures. The State will continue to foster institutions to provide financial aid to these industries, and special assistance will be given to enterprises organised on co-operative lines for industrial and agricultural purposes. In suitable cases, the State may also grant financial assistance to the private sector. Such assistance, especially when the amount involved is substantial, will preferably be in the form of participation in equity capital, though it may also be in part in the form of debenture capital.

11. Industrial undertakings in the private sector have necessarily to fit into the framework of the social and economic policy of the State and will be subject to control and regulation in terms of the Industries (Development and Regulation) Act and other relevant legislation. The Government of India, however, recognise that it would, in general, be desirable to allow such undertakings to develop with as much freedom as possible, consistent with the targets and objectives of the national plan. When there exist in the same industry both privately and publicly owned units, it would continue to be the policy of the State to give fair and non-discriminatory treatment to both of them.

12. The division of industries into separate categories does not imply that they are being placed in water-tight compartments. Inevitably, there will not only be an area of overlapping but also a great deal of dovetailing between industries in the private and the public sectors. It will be open to the State to start any industry not included in Schedule A and Schedule B when the needs of planning so require or there are other important reasons for it. In appropriate cases, privately owned units may be permitted to produce an item falling within Schedule A for meeting their own requirements or as by-products. There will be ordinarily no bar to small privately owned units undertaking production, such as the making of launches and other light-craft, generation of power for local needs and small scale mining. Further, heavy industries in the public sector may obtain some of their requirements of lighter components from the private sector, while the private sector in turn would rely for many of its needs on the public sector. The same principle would apply with even greater force to the relationship between large scale and small scale industries.

13. The Government of India would, in this context, stress the role of cottage and village and small scale industries in the development of the national economy. In relation to some of the problems that need urgent solutions, they offer some distinct advantages. They provide immediate large scale employment; they offer a method of ensuring a more equitable distribution of the national income and they facilitate an effective mobilisation of resources of capital and skill which

might otherwise remain unutilised. Some of the problems that unplanned urbanisation tends to create will be avoided by the establishment of small centres of industrial production all over the country.

14. The State has been following a policy of supporting cottage and village and small scale industries by restricting the volume of production in the large scale sector, by differential taxation, or by direct subsidies. While such measures will continue to be taken, whenever necessary, the aim of the State policy will be to ensure that the decentralised sector acquires sufficient vitality to be self-supporting and its development is integrated with that of large scale industry. The State will, therefore, concentrate on measures designed to improve the competitive strength of the small scale producer. For this it is essential that the technique of production should be constantly improved and modernised, the pace of transformation being regulated so as to avoid, as far as possible technological unemployment. Lack of technical and financial assistance, of suitable working accommodation and inadequacy of facilities for repair and maintenance are among the serious handicaps of small scale producers. A start has been made with the establishment of industrial estates and rural community workshops to make good these deficiencies. The extension of rural electrification and the availability of power at prices which the workers can afford will also be of considerable help. Many of the activities relating to small scale production will be greatly helped by the organisation of industrial co-operatives. Such co-operatives should be encouraged in every way and the State should give constant attention to the development of cottage and village and small scale industry.

15. In order that industrialisation may benefit the economy of the country as a whole, it is important that disparities in levels of development between different regions should be progressively reduced. The lack of industries in different parts of the country is very often determined by factors such as the availability of the necessary raw materials or other natural resources. A concentration of industries in certain areas has also been due to the ready availability of power, water supply and transport facilities which have been developed there. It is one of the aims of national planning to ensure that these facilities are steadily made available to areas which are at present lagging behind industrially or where there is greater need for providing opportunities for employment, provided the location is otherwise suitable. Only by securing a balanced and co-ordinated development of the industrial and the agricultural economy in each region, can the entire country attain higher standards of living.

16. This programme of industrial development will make large demands on the country's resources of technical and managerial personnel. To meet these rapidly growing needs for the expansion of the public sector and for the development of village and small scale industries, proper managerial and technical cadres in the public services are being established. Steps are also being taken to meet shortages at supervisory levels, to organise apprenticeship schemes of training on a large scale both in public and in private enterprises, and to extend training facilities in business management, in universities and other institutions.

17. It is necessary that proper amenities and incentives should be provided for all those engaged in industry. The living and working conditions of workers should be improved and their standard of efficiency raised. The maintenance of industrial peace is one of the prime requisites of industrial progress. In a socialist democracy labour is a partner in the common task of development and should participate in it with enthusiasm. Some laws governing industrial relations have been enacted and a broad common approach has developed with the growing recognition of the obligations of both management and labour. There should be joint consultation and workers and technicians should, wherever possible, be associated progressively in management. Enterprises in the public sector have to set an example in this respect.

18. With the growing participation of the State in industry and trade, the manner in which these activities should be conducted and managed assumes considerable importance. Speedy decisions and a willingness to assume responsibility are essential if these enterprises are to succeed. For this, wherever possible, there should be decentralisation of authority and their management should be along business lines. It is to be expected that public enterprises will augment the revenues of the State and provide resources for further development in fresh fields. But such enterprises may sometimes incur losses. Public enterprises have to be judged by their total results and in their working they should have the largest possible measure of freedom.

19. The Industrial Policy Resolution of 1948 dealt with a number of other subjects which have since been covered by suitable legislation or by authoritative statements of policy. The division of responsibility between the Central Government and the State Governments in regard to industries has been set out in the Industries (Development and Regulation) Act. The Prime Minister, in his statement in Parliament on the 6th April 1949, has enunciated the policy of the State in regard to foreign capital. It is, therefore, not necessary to deal with these subjects in this resolution.

20. The Government of India trust that this restatement of their Industrial Policy will receive the support of all sections of the people and promote the rapid industrialisation of the country.

SCHEDULE A

1. Arms and ammunition and allied items of defence equipment.
2. Atomic energey.
3. Iron and steel.
4. Heavy castings and forgings of iron and steel.
5. Heavy plant and machinery required for iron and steel production, for mining, for machine tool manufacture and for such other basic industries as may be specified by the Central Government.
6. Heavy electrical plant including large hydraulic and steam turbines.
7. Coal and lignite.
8. Mineral oils.
9. Mining of iron ore, manganese ore, chrome ore, gypsum, sulphur, gold and diamond.
10. Mining and processing of copper, lead, zinc, tin, molybdenum and wolfram.
11. Minerals specified in the Schedule to the Atomic Energy (Control of Production and Use) Order, 1953.
12. Aircraft.
13. Air transport.
14. Railway transport.
15. Shipbuilding.
16. Telephones and telephone cables, telegraph and wireless apparatus (excluding radio receiving sets).
17. Generation and distribution of electricity.

SCHEDULE B

1. All other minerals except "minor minerals" as defined in Section 3 of the Minerals Concession Rules, 1949.
2. Aluminium and other non-ferrous metals not included in Schedule 'A'.
3. Machine tools.
4. Ferro alloys and tool steels.
5. Basic and intermediate products required by chemical industries such as the manufacture of drugs, dyestuffs and plastics.
6. Antibiotics and other essential drugs.
7. Fertilizers.
8. Synthetic rubber.
9. Carbonisation of coal.
10. Chemical pulp.
11. Road transport.
12. Sea transport.

GIPN—S1—2 Planning Commission(56)—27-7-56—10,000.